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THE BIRDS OF CELEBES AND THE NEIGHBOURING ISLANDS.

BY

A. B. MEYER AND L. W. WIGLESWORTH.

VOLUME I.

WITH 17 PLATES (14 COLOURED) AND 7 COLOURED MAPS.

BERLIN:
R. FRIEDLÄNDER & SOHN.
1898.

CELEBES
AND
THE NEIGHBOURING ISLANDS

Scale 1: 7.500.000

0 50 100 200 Statute Miles
0 50 100 200 300 Kilom.

Sea colouring.
less than 100 fathoms
100 fathoms
more than 100 fathoms
.....only approximately fixed
150 no bottom reached

Celebesian Area

120° Long. East from Greenwich

Wagner & Debes' Geogr. Estab. Leipsic

CELEBES

Scale 1:3930000

0 10 20 30 40 50 60 70 80 90 100 Statute Miles

0 50 100 150 200 Kilom.

Heights in feet

120° 122° 124°

2° 4° 6°

North Peninsula

Gulf of Tomini

East peninsula

Peling Strait

Peling

Banggai Archipelago

Banggai

Sula Islands

Taliabu

Greyhound Strait

Togian Islands

Togian

Gulf of Tomaiki

Tomori

Lake Matanna

Lake Towuti

Luhu

South-east peninsula

Gulf of Boni

Lake Tempe

Boni

Kendari

Kambaino

Muna

Buton

Tukang besi Islands

Saleyer Island

Mandar

South peninsula

Macassar

Gowa

Peak of Bonthain c.9300

Lake Posso

Lake Limbotto

Lake Tondano

Mongondo

Bolaang

Gorontalo Distr.

Togian

Palos Bay

Dongala

Tomini

Parigi

Posso

Todjo

Mapane

Toukean

Palopo

Boran

Tontoli or Toli Toli

Buol

Malinang Mts.

Paguat

Negrilana

Manbagu

Amurang

Belang

Kawangkoan

Tanawangko

Manado

Bunaken Id.

Manado tua Id.

Mantehage or Mantrau Id.

Talissi Id.

Tendila Id.

Main

Banka Id.

Lembeh Id.

Lirupang

Lolak

Kema

Tondano

Lake Tondano

Ratahan

Salibabu

Sangi Is.

In the Minahassa:

1 = Mt. Dua Sudara c. 4500
2 = Mt. Klabat c. 6600
3 = Mt. Lokon c. 5200
4 = Mt. Masarang c. 4200
5 = Mt. Soputan c. 5900
6 = Lake Lahendong (Linow)
7 = Lakus-kassen
8 = Rurukan
9 = Remboken
10 = Langowan

Long. East from Greenwich

Wagner & Debes' Geogr. Estabt Leipsic

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PREFACE.

When we began this work six years ago, we were under the impression that it would not be premature to write "The Birds of Celebes", but the further we proceeded, the more we became aware how impossible it is at present to give a complete history of the species, as many undoubtedly still remain to be discovered in the interior and the mountains, not to speak of the islands; and in the case of others whose names are familiar to ornithologists, we encountered a great lack of knowledge touching their local distribution, their subtile variations — individual, geographical, seasonal, sexual, and developmental, — their movements or, as the case may be, migrations, with the questions bearing thereon of seasons, climate, flowering of plants, ripening of fruits and the like, their nidification and moulting, habits and economy. We, therefore, are conscious of the imperfection of our work and shall be entirely satisfied if it be useful to future workers on the Celebesian Avifauna, not doubting that a classical work could be ultimately written on the subject, of the standard of Naumann's "Vögel Deutschlands" in 12 volumes.

The principles of nomenclature are now again in process of development and, consequently, unsettled; it is impossible to meet with the approval of every one in this respect. Our endeavours to give nomenclatory expression to the minute variations of groups of individuals not yet formed into species or subspecies led us to adopt an innovation discussed on pp. 52, 53 and elsewhere in the text; we anticipate that ere long this will be superseded by something better, and only regard it ourselves as a first step towards indicating those minute complex variations of a species within itself, which occur in Nature and are of such great importance in the study of evolution.

In our synonymy an attempt at completeness has rarely been made, except in the case of endemic Celebesian birds; and, instead of an aimless repetition of the fuller synonymies in, for instance, the "Catalogue of Birds" and the "Ornitologia

della Papuasia, etc.", reference is given to the authors of these works, to whom we feel deeply indebted, as indeed every ornithologist will be. As to the abbreviation of authors' names, we had proceeded too far to remodel them when the German list was issued, but we have introduced the methods recommended there at the headings of the species.

We have never used the term "Malay Archipelago", so much in vogue since Wallace, because this expression is incorrect in this sense, that not all the inhabitants of the islands comprehended are Malays. It is the "East Indian Archipelago" of which we speak, having in view the island-world from Sumatra to the Solomon Islands and from the Philippines to the Lesser Sundas.

As to localities we have been as accurate as possible, but unfortunately it is only in recent times that collectors have attached the exact locality to every specimen. Formerly "Manila" meant the whole of the Philippines, "Manado" the whole Minahassa (Northern Celebes), "Macassar" the southern part of Celebes; though, for instance, Mr. Wallace did not shoot all of his birds labelled Macassar near that town, but some at Maros and elsewhere. Of course we could not eliminate these inaccuracies. The future writer on the Birds of Celebes will happily have to deal with more exact data.

Our artist, Mr. Geisler of the Dresden Museum, wishes us to draw attention to the circumstance that the dull colours of some of our plates have been intentionally used at our request, the exact hue of the specimen painted being aimed at, sometimes at the cost of the artistic effect and clearness of tint usually seen in the English productions.

And now we have the agreeable duty of thanking all those who have lent us their welcome aid during our six years' work. In the first place Dr. P. and Dr. F. Sarasin of Basel, who placed their highly valuable and important collections entirely at our disposal; and not less the Hon. Walter Rothschild of Tring, who joined us in engaging native hunters for completing our collections and for making investigations on much new ground in our Area, as will be seen throughout the book. Mr. Nehrkorn of Riddagshausen most generously furnished us with a MS. descriptive of the eggs of Celebesian birds in his celebrated collection, and many are now described for the first time. Dr. van der Stok of Batavia and Prof. Neumayer of Hamburg helped us with our meteorological maps, as mentioned pp. *21* and *37* of the Introduction. Dr. Bowdler Sharpe of London had the great kindness to send us the proof-sheets of his part of vol. XXVI of the "Catalogue of Birds", not yet out. Mr. Veen of Kele Londej (Minahassa) and Mr. North of Sydney sent us some notes bearing upon the question of migration,

quoted in our Introduction, pp. *39* and *47*. For the transmission of specimens we are much indebted to the following gentlemen: Prof. W. Blasius of Brunswick, Dr. Büttikofer of Leyden (now Rotterdam), Dr. A. Dubois of Brussels, Mr. Gurney of Norwich, Mr. Hartert of Tring, Prof. Hertwig of Munich, Prof. v. Koch of Darmstadt, Dr. v. Lorenz of Vienna, Mr. Pleske of St. Petersburg, Dr. E. P. Ramsay of Sydney, Prof. Reichenow of Berlin, and Mr. W. Schlüter of Halle; as well as for special information to Prof. de Groot of Leyden, Resident Jellesma of Manado, Prof. Kern of Leyden, Prof. Newton of Cambridge, Dr. Oustalet of Paris, Dr. Riedel of the Hague, and Count Salvadori of Turin. Inspector Lehnig of the Dresden Museum has assisted us in drawing up the lists of Geographical Distribution and of Local Avifaunas, the alphabetical Index and list of abbreviations, and has supported us in other ways; as has also Miss C. S. Fox of London by her aid in the correction of the proofs.

Should we, unhappily, have forgotten any one in rendering our thanks, we apologize for such an omission.

Finally our sincere thanks are due to the Publishers for their compliance in all our wishes as to the fashion of the book.

Royal Zoological Museum, Dresden, April 30th, 1898.

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ALPHABETICAL LIST OF ABBREVIATIONS OF AUTHORS' NAMES, TITLES OF BOOKS, JOURNALS, ETC.

Our abbreviations were made before the issue of the list used in the "Zoological Record", which is recommended by the "Deutschen Zoologische Gesellschaft" as a model for such, or we would have adopted at least a part of them, but many are far too long to be made use of in a synonymy, and others are not practical.

Portions of abbreviations here enclosed in brackets are often omitted in the text.

Abh. (Ber.) Mus. Dresden = Abhandlungen und Berichte des Kgl. Zoologischen und Anthropologisch-Ethnographischen Museums zu Dresden.

Abh. (Naturw.) Ver. Bremen = Abhandlungen herausgegeben vom naturwissenschaftlichen Vereine zu Bremen.

Abh. Senckenb. Naturf. Ges. = Abhandlungen herausgegeben von der Senckenbergischen naturforschenden Gesellschaft. Frankfurt am Main.

Acta (Nova) Acad. Leop. (Carol.) = Nova Acta Academiae Caesareae Leopoldino-Carolinae Germanicae Naturae Curiosorum. Also = Verhandlungen der Kaiserlichen Leopoldinisch-Carolinischen Deutschen Akademie der Naturforscher.

Alb., Nat. Hist. B. = E. Albin: Natural history of British Birds. 1738—40.

Am. Journ. of Sc. & Arts = American Journal of Science and Arts.

Ann. (K. K.) Nat. Hofmus. (Wien) = Annalen des K. K. Naturhistorischen Hofmuseums zu Wien.

Ann. Mus. Civ. Gen. = Annali del Museo Civico di Storia Naturale di Genova.

Ann. (& Mag.) N. H. = The Annals and Magazine of Natural History, including Zoology, Botany, and Geology.

Ann. Sc. Nat. = Annales des Sciences Naturelles. Zoologie et Paléontologie.

Arch. Nat. = Archiv für Naturgeschichte.

Atti Ac. Sc. Tor(ino). = Atti della Reale Accademia delle Scienze di Torino.

Atti Soc. It. Sc. Nat. Mil. = Atti della Società italiana di Scienze naturali. Milano.

Audubon, B. N. Am. = J. J. Audubon: The Birds of America. 1826 seq.

Auk = The Auk. Quarterly Journal of Ornithology.

Ausland = Das Ausland. Wochenschrift für Länder- und Völkerkunde.

Baird, Brew. & Ridg., Water B. N. Am. = S. F. Baird, T. M. Brewer, and R. Ridgway: The Water Birds of North America. 1884. (Memoirs of the Museum of Comparative Zoölogy at Harvard College, Vol. VII and XIII.)

Baldamus, Leben europ. Kuck. = E. Baldamus: Das Leben der europäischen Kuckucke. Nebst Beiträgen zur Lebenskunde der übrigen parasitischen Kuckucke und Stärlinge. 1892.

Bartl., (Mon.) Weaver-b. = A. D. Bartlett: A Monograph of the Weaver-birds. 1888.

Bechst., Naturg. Deutschl. = J. M. Bechstein: Gemeinnützige Naturgeschichte Deutschlands, nach allen 3 Reichen. 2. verb. Aufl. 1801—1809.

Bechst., Orn. Taschenb. = J. M. Bechstein: Ornithologisches Taschenbuch von und für Deutschland. 1802—12.

Begbie, Malay Penin. = P. J. Begbie: The Malayan Peninsula; history, manners and customs of the inhabitants, politics, natural history etc. 1834.

Bijdr. (t. d.) Dierk. = Bijdragen tot de Dierkunde. Uitgegeven door het K. Zoologisch Genootschap "Natura artis magistra", Amsterdam.

Bijdr. taal, land, volkenk. Ned. Ind. = Bijdragen tot de Taal-, Land- en Volkenkunde van Nederlandsch Indië.

Blanf., Faun. Br. Ind(ia) B. = The Fauna of British India, incl. Ceylon and Burma. Ed. by W. T. Blanford. Birds, by E. W. Oates and W. T. Blanford. 1889—1895.

Blak., Amend. List B. Jap. = T. W. Blakiston: Amended List of the Birds of Japan, according to Geographical Distribution. 1884.

W. Blas., Braunschw. Anzeigen = W. Blasius in the "Braunschweigischen Anzeigen" (Newspaper).

W. Blas., Russ's Isis = W. Blasius in Karl Russ' "Isis": Zeitschrift für alle naturwissenschaftlichen Liebhabereien.

Blyth, B. Burmah = E. Blyth: A Catalogue of the Mammals and Birds of Burmah (Journal of the Asiatic Society of Bengal, 1875, pt. II, extra number).

Blyth, Cat. (B.) Mus. A(s). S. (B.) = E. Blyth: A Catalogue of the Birds in the Museum of the Asiatic Society. 1849.

Bodd., Tabl. Pl. Enl. = M. Boddaert: Table des planches enluminéez d'histoire nat., de d'Aubenton. 1783.

Boll. Mus. Torino = Bollettino dei Musei di Zoologia ed Anatomia comparata della R. Università di Torino.

Bonn., Tabl. Enc. Méth. = Encyclopédie méthodique, ou par ordre de matière, par une société de gens de lettres. — Histoire naturelle. — Tableau encyclopédique et méthodique: Ornithologie. Par l'abbé Bonnaterre, 1790.

Bourjot, Perr. = A. Bourjot St.-Hilaire: Histoire Naturelle des Perroquets, vol. III, 1837—38 (vols. I and II by Le Vaillant, 1801 and 1805).

Bourns & Worces., B. Menage Exped. = F. S. Bourns and D. C. Worcester: Preliminary Notes on the Birds and Mammals eollected by the Menage Scientific Expedition to the Philippine Islands (Occasional Papers of the Minnesota Academy of Natural Sciences, Vol. I No. 1). 1894.

Bp., Cat. Ucc. Eur. = C. L. Bonaparte: Catalogo metodico degli Uccelli Europei. (Annali delle scienze naturali. Tom. VIII. 2ª semestre.) 1842.

Bp., Comp. List B. Eur. & N. Am. = C. L. Bonaparte: A geographical and comparative list of the Birds of Europe and North America. 1838.

Bp., Consp. = C. L. Bonaparte: Conspectus generum avium. 1850—65.

Bp., Consp. Vol. Anisod. = C. L. Bonaparte: Conspectus Volucrum Anisodactylorum. 1854.

Bp., Consp. Vol. Zygod. = C. L. Bonaparte: Conspectus Volucrum Zygodactylorum. 1854.

Bp., Coup d'Oeil Ordre Pig. = C. L. Bonaparte: Coup d'Oeil sur l'Ordre des Pigeons. (Comptes Rendus hebdomadaires des séances de l'Académie des Sciences, Paris. — Articles in vols. XXXIX, 1854; XL, 1855; XLIII, 1856.)

Bp., Icon. des Pig. = C. L. Bonaparte: Iconographie des Pigeons. 1857.

Bp., Notes Orn. Coll. Delattre = C. L. Bonaparte: Notes ornithologiques sur les collections rapportées en 1853, par M. A. Delattre, et classification parallélique des Passereaux chanteurs. Paris 1854.

Brehm, Tierl. = Brehms Tierleben. Allgemeine Kunde des Tierreichs. 3. gänzlich neubearbeitete Auflage. Vögel. 1891.

Brehm, Vög. Deutschl. = C. L. Brehm: Handbuch der Naturgeschichte aller Vögel Deutschlands. 1831.

Briss., Orn. = M. J. Brisson: Ornithologia s. synopsis methodica, sist. Avium divisionem in ordines etc. 1760.

Brügg., Abh. Ver. Bremen = F. Brüggemann in Abhandlungen herausgegeben vom naturwissenschaftlichen Vereine zu Bremen.

Bütt., (Zool. Erg.) Weber's Reise (Ostind.) = J. Büttikofer in: Zoologische Ergebnisse einer Reise in Niederländisch Ost-Indien. Herausgegeben von Max Weber. 1890—97.

Buff., H. N. Ois. = G. L. Leclerc comte de Buffon, de Montbeillard (et l'abbé Bexon): Histoire naturelle des Oiseaux. 10 vols. (Small fol. ed.) 1770—86.

Bull. Ac. Imp. Mosc. = Bulletin de la Société Impériale des Naturalistes de Moscou.

Bull. Ac. Sc. Petersb. = Bulletin de l'Académie Impériale des Sciences de St. Pétersbourg.

Bull. Brit. Orn. Club = Bulletin of the British Ornithologists' Club.

Bull. Mus. Belg. = Bulletin du Musée Royal d'Histoire Naturelle de Belgique.

Bull. Mus. Comp. Zool. Cambridge = Bulletin of the Museum of Comparative Zoölogy at Harvard College, Cambridge, Mass.

Bull. of the U. S. Geol. and Geogr. Survey = Bulletin of the United States Geological and Geographical Survey of the Territories.

Bull. Soc. Philom. (Paris) = Bulletin de la Société Philomatique de Paris.

Bull. S(oc). Z(ool). Fr(ance) = Bulletin de la Société zoologique de France.

Bull. U. S. Nat. Mus. = Bulletin of the U. S. National Museum.

Buller, B. N. Zeal. = W. L. Buller: A History of the Birds of New Zealand. I. ed. 1873; 2. ed. 1888.

Butler, Foreign Finches = A. G. Butler, Foreign Finches in captivity. 1894—96.

Cab. & Hein., Mus. Hein. = J. Cabanis & F. Heine jun.: Museum Heineanum. Verzeichniss der ornithologischen Sammlung des Oberamtmanns F. Heine. 1850—63.

Calc. Journ. Nat. Hist. = Calcutta Journal of Natural History.

Campb., Ber. II. Orn. Congress Budapest = A. J. Campbell, in: Zweiter internationaler ornithologischer Congress. Budapest 1891. Hauptbericht. II. Wissenschaftlicher Theil. 1892.

Cass., B. Calif. = J. Cassin: Illustrations of the Birds of California, Texas, Oregon, British and Russian America. 1853—55.

Cass., Cat. Halc. Philad. Mus. = J. Cassin: Catalogue of the Halcyonidae in the Collection of the Academy of Natural Sciences of Philadelphia. 1852.

Cass., U. S. Expl. Exp(ed). 2nd ed. = J. Cassin: United States Exploring Expedition. — Mammalogy and Ornithology. 1858.

Cat. B. = Catalogue of the Birds in the British Museum.

C. R. Congr. Int. des sc. géogr. à Paris = Congrès international des sciences géographiques tenu à Paris 1875. Compte rendu des séances. 1878—80.

C(omptes) R(end). = Comptes rendus hebdomadaires des séances de l'Académie des sciences, Paris.

Cretzschm. in Rüpp. Atlas = (W. P.) E. Rüppell: Atlas zu der Reise im nördlichen Afrika. 2. Abtheilung Vögel. Bearbeitet von P. J. Cretzschmar. 1826.

Cuv., Règne An. = G. Cuvier: Le règne animal, distribué d'après son organisation. 1829—30.

Darwin, Anim. & Plants = C. Darwin: The variation of animals and plants under domestication. 1868—69.

D'Aubent., Pl. Enl. = D'Aubenton le jeune: Planches enluminées d'histoire naturelle par Martinet, exécutées par D'Aubenton le jeune. 1765.

Daud., Tr. d'Orn. = F. M. Daudin: Traité élémentaire et complet d'Ornithologie, ou histoire naturelle des Oiseaux. 1800.

David et Oust., Ois. Chine = A. David et E. Oustalet: Les Oiseaux de la Chine. 1877.

Des Murs & Prév., Voy. Vénus, Zool. = Des Murs et Prévost, in the Voyage autour du monde sur la frégatte "la Vénus", commandée par A du Petit-Thouars. 1845—64.

Deutsche geogr. Blätter = Deutsche geographische Blätter, herausgegeben von der Geographischen Gesellschaft in Bremen.

Diggles, Orn. Austr. = S. Diggles: The Ornithology of Australia. 1866—70.

Direct. Ind. Arch. = A. G. Findlay: A Directory for the navigation of the Indian Archipelago. 1870.

Drap., Dict. Class. H(ist). N(at). = Drapiez: Dictionnaire classique des sciences naturelles etc. 1828—45.

Dresser, B. Eur. = H. E. Dresser: A history of the birds of Europe, including all the species inhabiting the Western Palaearctic Region. 1871—81, 1895—96.

Dresser, Mon. Corac. = H. E. Dresser: A Monograph of the Coraciidae. 1893.

Dresser, Monogr. Merop. = H. E. Dresser: A Monograph of the Meropidae. 1884—86.

Dumont, Dict. Sc. Nat. = C. H. F. Dumont: Dictionnaire des sciences naturelles. 1828—45.

Edw., Birds = G. Edwards: A natural history of uncommon Birds, and of some other rare and nondescribed animals, Quadrupedes, Reptiles, Fishes, Insects etc. 1743—51.

Edw., Glean. = G. Edwards: Gleanings of natural history, exhibiting figures of Quadrupeds, Birds, Insects, Plants etc. 1758—64.

Elliot, Monogr. Bucerot. = D. G. Elliot: A monograph of the Bucerotidae, or family of the Hornbills. 1882.

Elliot, Monogr. Pitt. = D. G. Elliot: A Monograph of the Pittidae. 1893—95.

Festschr. Vers. Naturf. Braunschw. 1897 = Festschrift der Herzoglichen Technischen Hochschule bei Gelegenheit der 69. Versammlung Deutscher Naturforscher und Aerzte in Braunschweig. 1897.

Festschrift zool.-bot. Ges. = Festschrift zur Feier des 25jährigen Bestehens der k. k. zoologisch-botanischen Gesellschaft in Wien. 1876.

de Fil., Mus. Mediol. = Ph. de Filippi: Museum Mediolanum, N. 1, Animalia Vertebrata, Classis II. Aves. 1847.

Finsch, J. Mus. Godef. = O. Finsch: Zur Ornithologie der Südsee-Inseln. I. Die Vögel der Palaugruppe. II. Ueber neue und weniger gekannte Vögel von den Viti-, Samoa- und Carolinen-Inseln. (Journal des Museum Godeffroy. Heft VIII, XII.) 1875—76.

Finsch, N(eu) G(uinea) = O. Finsch: Neu-Guinea und seine Bewohner. 1865.

Finsch, Papag. = O. Finsch: Die Papageien. 1867—68.

Finsch, Vög. der Südsee = O. Finsch: Ueber Vögel der Südsee, in Mittheilungen des ornithologischen Vereins in Wien, 1884.

Finsch & Hartl., Orn. Centralpol. = O. Finsch & G. Hartlaub: Beitrag zur Fauna Centralpolynesiens. Ornithologie der Viti-, Samoa- und Tonga-Inseln. 1867.

Finsch & Hartl., Vög. O. Afr. = O. Finsch und G. Hartlaub: Die Vögel Ost-Afrikas. (C. C. von der Decken: Reisen in Ost-Afrika. 4. Bd.) 1870.

Flem., Phil. of Zool. = J. Fleming: Philosophy of zoology; or a general view of the structure, functions and classification of animals. 1822.

Forst., Descr. An. = J. R. Forsteri: Descriptiones animalium in itinere ad Maris Australis terras 1772—74 suscepto observatorum. Ed. H. Lichtenstein. 1844.

Forst(er), Zool. Ind. = J. R. Forster: Zoologia Indica. 1781.

Fraser, Zool. Typ. (Av.) = L. Fraser: Zoologia Typica, or figures of new and rare Mammals and Birds. 1841—9.

Fritsch, Vög. Eur. = A. Fritsch: Vögel Europa's. 1871.

Gadow, Vög. in Bronn's Kl. u. Ord. = H. G. Bronn's Klassen und Ordnungen des Thier-Reichs, wissenschaftlich dargestellt in Wort und Bild. 6. Band. IV. Abth. Vögel. Von E. Selenka u. H. Gadow. 1891-3.

Gätke, Vogelw. Helgol. = H. Gätke: Die Vogelwarte Helgoland. 1891.

Garnot, Voy. Coquille, Zool. Atl. = Voyage autour du monde, exécuté par ordre du roi, sur la Corvette d. S.. M. la Coquille pendant les années 1822—25. Publié par L. J. Duperrey. Zoologie, par Lesson et Garnot. 1826.

Gefied. Welt = Die gefiederte Welt. Wochenschrift für Vogelliebhaber,- Züchter und -Händler. Herausg. von K. Russ.

Gerini, Orn. Meth. Dig. = Giovanni Gerini: Storia Naturale degli uccelli, trattata con metodo e adornata di figure intagliate in rame e miniata al naturale. Firenze 1767—76.

Gigl., Avif. Ital(ica) = E. H. Giglioli: Avifauna Italica. Elenco delle specie di uccelli stazionarie o di passagio in Italia. 1886.

Gigl., Avif. Ital. pt. I = E. H. Giglioli: Primo resoconto dei risultati della inchiesta ornitologica in Italia. I. Avifauna Italica. 1889.

Gigl. & Manz., Icon. Avif. Ital. = E. H. Giglioli & A. Manzella: Iconografia dell' Avifauna Italica, ovvero Tavole illustranti le specie di Uccelli che trovansi in Italia, con brevi descrizioni e note. 1882—84.

Gld., B. Eur. = John Gould: The Birds of Europe. 1832—37.

G(ou)ld., B. Asia = John Gould: The Birds of Asia. 1850—1883. [Completed by R. Bowdler Sharpe.]

Gld., B. Austr. = John Gould: The Birds of Australia. 1848—69.

Gld., B. Gr. Brit. = John Gould: The Birds of Great Britain. 1862—1873.

Gld., B. N(ew) Guinea = John Gould: The Birds of New-Guinea and the adjacent Papuan Islands, including any new species that may be discovered in Australia. 1875—88. [Completed by R. Bowdler Sharpe.]

Gld., Handb. B. Austr. = John Gould: Handbook of the Birds of Australia. 1865.

Gld., Syn. B. Austr. = John Gould: A Synopsis of the Birds of Australia and its adjacent Islands. 1837.

Globus = Globus. Illustrierte Zeitschrift für Länder- und Völkerkunde.

Gm., S(yst). N(at). = Caroli Linnaei Systema Naturae. Ed. XIII., aucta, reformata. Cura J. F. Gmelin. Lipsiae 1788—93.

Gould, Cent. Himal. B. = John Gould: A Century of Birds from the Himalaya Mountains. 1832.

Graafland, De Minahassa = N. Graafland: De Minahassa. Haar verleden en haar tegenwoordige toestand. 1867—69.

Grant, Handb. Game B. = W. R. Ogilvie-Grant: A Hand-book to the Game-Birds. 1895—97. In Allen's Naturalist's Library, ed. by R. B. Sharpe.

Gray, B. Trop. Is. = G. R. Gray: Catalogue of the Birds of the Tropical Islands of the Pacific Ocean, in the collection of the British Museum. 1859.

Gray, Cat. B. New Guin. = J. E. Gray & G. R. Gray: Catalogue of the Mammalia and Birds of New Guinea, in the collection of the British Museum. 1859.

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Pleske, Vög. Russ. Reichs = Th. Pleske: Ornithographia Rossica. Die Vogelfauna des Russischen Reichs. II. Sylviinae. 1891.

Pr. Acad. (N. Sc.) Philad. = Proceedings of the Academy of Natural Sciences of Philadelphia.

Pr. L. Soc. N. S. W. = Proceedings of the Linnean Society of New South Wales.

P. U. S. Nat. Mus. = Proceedings of the U. S. National Museum.

P. Z. S. = Proceedings of the Zoological Society of London.

Prév. & Knip, Pig. = C. J. Temminck: Histoire naturelle générale des Pigeons avec figures en couleurs peintes, etc. Tome II. cont. les Pigeons exotiques de M^me^ Knip. Le texte par F. Prévost. 1838—43.

Proc. Boston Soc. Nat. Hist. = Proceedings of the Boston Society of Natural History.

Quoy & Gaim., Voy. Astr. (Zool.) = Quoy & Gaimard in: Voyage autour du monde de la corvette L'Astrolabe exécuté 1826—29 sous le commandement de Dumont d'Urville. Zoologie. 1830—33.

Radde, Reise S.-O. Sibir. = G. Radde: Reisen im Süden von Ost-Sibirien, 1855—59. 1862—63.

Rams(ay), Tab. List (Austr. B.) = E. P. Ramsay: Tabular list of all the Australian birds at present known to the author, showing the distribution of the species over the continent of Australia and adjacent islands. 1888.

W. Rams., Tweedd. Orn. Works = The ornithological works of Arthur, IX. Marquis of Tweeddale. Ed. by R. G. W. Ramsay. 1881.

Rchb., Columbariae or Tauben = H. G. L. Reichenbach: Die vollständigste Naturgeschichte der Tauben und taubenartigen Vögel. Columbariae. 1848.

Rchb., Fulic(ariae), Novit. = H. G. L. Reichenbach: Die vollständigste Naturgeschichte der Sumpfvögel: Novitiae ad synopsin avium. III. Rasores: Scharrvögel. I. Fulicariae: Wasserhühner. 1851.

Rchb., Handb. Picinae = H. G. L. Reichenbach: Handbuch der speciellen Ornithologie. Picinae. 1854.

Rchb., Grallat. = H. G. L. Reichenbach: Die vollständigste Naturgeschichte der Sumpfvögel: Aves Grallatores. 1851.

Reichb., Hb. sp. Orn. Alcedin. = L. Reichenbach: Handbuch der speciellen Ornithologie. Alcedineae. 1851.

Reichb., Hb. sp. Orn. Meropinae = L. Reichenbach: Handbuch der speciellen Ornithologie. Meropinae. 1852.

Reichb., Hb. Scansoriae = L. Reichenbach: Handbuch der speciellen Ornithologie. Scansoriae. 1853.

Rchb., Syn. Av. Gallinac. = L. Reichenbach: Synopsis avium. Gallinaceae. 1848.

Rchb., S. A., Natatores = H. G. L. Reichenbach: Die vollständigste Naturgeschichte der Schwimmvögel: Aves Natatores. Synopsis Avium. Vol. I. Natatores. 1845.

Rchb., Syst. Av. (Natur.) = L. Reichenbach: Avium systema naturale. Das natürliche System der Vögel. Vorläufer einer Iconographie der Arten der Vögel aller Welttheile. 1850. Also under the title: Ornithologie méthodique ou exposé des genres des oiseaux de toutes les parties du monde. Prodrome d'une iconographie des espèces des oiseaux ou synopsis avium.

Rchnw., Vogelb. = A. Reichenow: Vogelbilder aus fernen Zonen. Abbildungen und Beschreibungen der Papageien. 1878—83.

Rchnw., Consp. Psitt. = A. Reichenow: Conspectus Psittacorum. Systematische Uebersicht aller bekannten Papageienarten. In: Journal für Ornithologie. 1882.

Rchw., Vög. Deutsch O.-Afr. = Deutsch-Ostafrika. Thierwelt Ostafrikas und der Nachbargebiete. III. Bd. 2. Lf. Vögel von A. Reichenow. 1894.

Reinw., Reis. Ind. Arch. (in 1821) = C. G. C. Reinwardt's Reis naar het oostelijk gedeelte van den Indischen Archipel in het jaar 1821. Uitgegeven door W. H. de Vriese. 1858.

Rev. Zool. = Revue zoologique, par la Société Cuvierienne.

Ridgw., (B. N. Am.) Landb. N. Am. = S. F. Baird, T. M. Brewer, and R. Ridgway: A History of North American Birds, Land Birds. 1874.

Ridgw., Man. N. Am. Birds = R. Ridgway: A manual of North American Birds. 1887.

Ridgw., Sm. Rep. = R. Ridgway: in the Annual Report of the Board of Regents of the Smithsonian Institution.

Ros(enb)., Mal. Arch. = C. B. H. v. Rosenberg: Der malayische Archipel. Land und Leute. 1878.

Rosenb., Reistogt. in Gorontalo = C. B. H. v. Rosenberg: Reistogten in de afdeeling Gorontalo. 1865.

Rothsch., Av. Laysan = W. Rothschild: The Avifauna of Laysan and the neighbouring Islands; with a complete History to date of the Birds of the Hawaiian Possessions. 1893.

Rowl., Orn. Misc. = Ornithological Miscellany. Ed. by G. D. Rowley. 1875—78.

Russ, Einheim. Stubenvög. = K. Russ: Handbuch für Vogelliebhaber, -Züchter und -Händler. II. Einheimische Stubenvögel. 1873.

Russ, Fremdl. Stubenvög. = K. Russ: Die fremdländischen Stubenvögel. 1879—98.

Sail. Direct. = A. G. Findlay: A Directory for the Navigation of the Indian Archipelago etc. 1870.

Salvad., Agg. Orn. Pap. = T. Salvadori: Aggiunte alla ornitologia della Papuasia e delle Molucche. 1889—91.

Salvad., Orn. Pap. = T. Salvadori: Ornitologia della Papuasia e delle Molucche. 1880—82.

Salvad., Cat. Ucc. (di) Borneo = Catalogo sistematico degli uccelli di Borneo di T. Salvadori con note ed osservazioni di G. Doria ed O. Beccari intorno alle specie da essi raccolte nel Ragiato di Sarawak. Annali del Museo Civico di Storia naturale di Genova. Vol. V. 1874.

Sb. Ges. natf. Freunde zu Berlin = Sitzungs-Bericht der Gesellschaft naturforschender Freunde zu Berlin.

Schinz, Abbild. Vög. = H. R. Schinz: Naturgeschichte und Abbildungen der Vögel. Nach den neuesten Systemen bearbeitet. (1831—33.) 1835—36.

Schinz, Nat. Vög. — H. B. Schinz: Naturgeschichte der Vögel. Mit kolorirten Abbildungen nach der Natur und den vorzüglichsten naturwissenschaftlichen Werken gezeichnet. Neueste (2.) umgearbeitete und sehr vermehrte Ausgabe. 1846—53.

Schl., (De) Dierent. = H. Schlegel & P. J. Witkamp: De dierentuin van het kon. zoolog. Genootschap Natura Artis Magistra. Amsterdam. 1872.

Schl., H(an)dl. (d.) Dierk. = H. Schlegel: Handleiding tot de beoefening der dierkunde. 1857—58.

Schl., Mus. P.-B. = Muséum d'Histoire Naturelle des Pays-Bas. Par H. Schlegel. Revue méthodique et critique des collections. 1862—94.

Schl., N. T. D. or Ned. Tdschr. = H. Schlegel in Nederlandsch Tijdschrift voor de Dierkunde, uitgegeven door het Koninklijk zoologisch Genootschap Natura Artis Magistra. 3. deel. 1866.

Schl., Rev. Acc(ip). = H. Schlegel: Revue de la Collection des Oiseaux de Proie faisant partie du Musée des Pays-Bas. Accipitres. 1873. (In Mus. d'H. N. d. P.-B.)

Schl., Rev. Alcedin. = H. Schlegel: Revue de la Collection des Alcédines faisant partie du Musée des Pays-Bas. 1874. (In Mus. d'H. N. d. P.-B.)

Schl., Rev. Noctuae = H. Schlegel: Revue de la Collection des Oiseaux de Proie faisant partie du Musée des Pays-Bas. Aves Noctuae. 1873. (In Mus. d'H. N. d. P.-B.)

Schl., Revue Pitta = H. Schlegel: Revue de la Collection des Brèves (Pitta) faisant partie du Musée des Pays-Bas. 1874. (In Mus. d'H. N. d. P.-B.)

Schl., Rev. Psitt. = H. Schlegel: Revue de la Collection des Perroquets (Psittaci) faisant partie du Musée des Pays-Bas. 1874. (In Mus. d'H. N. d. P.-B.)

Schl., Valkv. (Ned. Ind.) = H. Schlegel: De vogels van Nederlandsch-Indië, beschreven en afgebeeld. — Les oiseaux des Indes Néerlandaises, décrits et figurés. Monographie 3, Valkvogels (Accipitres). 1866.

Schl., Vog. Ned. Ind. Ijsvogels (Alcedin.) = H. Schlegel: De vogels van Nederlandsch Indië, beschreven en afgebeeld. — Les oiseaux des Indes Néerlandaises, décrits et figurés. Monographie 2, Ijsvogels, (Martins-Pêcheurs). 1864.

Schl., Vog. Ned. Ind. Pitta = H. Schlegel: De vogels van Nederlandsch Indië, beschreven en afgebeeld. — Les oiseaux des Indes Néerlandaises, décrits et figurés. Monographie 1, Pitta. 1863.

Schl. & Pollen, Faun. Madag. = F. P. L. Pollen et D. C. van Dam: Recherches sur la faune de Madagascar et de ses dépendances. 2. partie: Mammifères et Oiseaux par H. Schlegel et F. P. L. Pollen. 1868.

Schmeltz, Eth. Abth. Mus. Godef. = J. D. E. Schmeltz, & R. Krause: Die Ethnographisch-Anthropologische Abtheilung des Museum Godeffroy in Hamburg. 1881.

Schrenck, Reis(e) Amurl(ande), Vög. = L. v. Schrenck: Reisen und Forschungen im Amur-Lande, 1854—56. Bd. I, 2. Vögel des Amur-Landes. 1860.

Sclat., List. Vert. An. = List of the vertebrated animals now or lately living in the Gardens of the Zoological Society of London. 8. ed. 1883. By P. L. Sclater.

Sclat., Voy. Chall. B. = P. L. Sclater in Report on the scientific results of the voyage of H. M. S. Challenger, 1873—76. Zoology. Vol. II. 1881.

Scop(oli), Del. Flor. & Faun. Insubr. = J. A. Scopoli: Ornithological papers from his Deliciae florae et faunae insubricae. 1786—88. Ed. by A. Newton (Willughby Soc. 1882).

Seebohm, B. Japan. (Emp.) = H. Seebohm: The Birds of the Japanese Empire. 1890.

Seebohm, (Hist.) Br(it(ish) B. = H. Seebohm: A history of British birds with illustrations of their eggs. 1883—85.

Seeb., Distr. Charadr. = H. Seebohm: The geographical distribution of the family Charadriidae or the Plovers, Sandpipers, Snipes and their allies. 1888.

Selby, Nat. Libr., Parrots = The Naturalist's Library. Conducted by William Jardine. Ornithology Vol. VI. Parrots by P. J. Selby. 1836.

Selby, Natur. Libr., Pig. = The Naturalist's Library. Conducted by William Jardine. Ornithology Vol. V, part. III, Pigeons by P. J. Selby. 1835.

Sharpe, Mitth. Zool. Mus. Dr. = R. B. Sharpe in Mittheilungen aus dem K. Zoologischen Museum zu Dresden.

Sharpe, Monogr. Alcedin. = R. B. Sharpe: A monograph of the Alcedinidae. 1868—71.

Sharpe, Rep. Trans. Venus Exp. B. Kerguelen = Account of the Petrological, Botanical and Zoological Collections made in Kerguelen's Land and Rodriguez during the Transit of Venus Expedition carried out in 1874—75. Birds by R. B. Sharpe. 1879.

Sharpe, Report Voy. "Alert" = Report on the zoological collections made in the Indo-Pacific Ocean during the voyage of H. M. S. "Alert", 1881—82. 1884.

Sharpe, Yarkand Mission, Aves = Scientific results of the second Yarkand Mission, based upon the collections of the late F. Stoliczka. 1878—91.

Sh. & Dresser, B. Eur(ope) = H. E. Dresser: A history of the birds of Europe, including all the species inhabiting the Western Palaearctic Region. 1871—81.

Sharpe & Wyatt, Mon. Hirund. = R. B. Sharpe & C. W. Wyatt: A monograph of the Hirundinidae, or family of Swallows. 1885—94.

Shaw, Gen. Zool. = G. Shaw: General zoology, or systematic natural history, with plates from the first authorities and most select specimens, engraved principally by Heath. Continued by Stephens. 1800—19.

Shelley, B. Egypt. = G. E. Shelley: A Handbook to the Birds of Egypt. 1872.

Shelley, Monogr. Nect. = G. E. Shelley: A monograph of the Nectariniidae, or family of Sun-birds. 1876—80.

Sitzb. Ak. Wien = Sitzungsberichte der math.-naturw. Classe der Kais. Akademie der Wissenschaften, Wien.

Sitzb. Ak. Wiss. Berlin = Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin.

Sitzb. Ges. Isis, Dresden = Sitzungsberichte und Abhandlungen der Naturwissenschaftlichen Gesellschaft Isis in Dresden.

Sonn(erat), Voy. N(ouv). Guin. = P. Sonnerat: Voyage à la nouvelle Guinée, dans lequel on trouve la description des lieux, des observations physiques et morales, et des détails rélatifs à l'histoire naturelle dans le règne animal et le règne végétal. 1776.

Souancé, Icon. Perr. = C. de Souancé: Iconographie des Perroquets non figurés dans les publications de Levaillant et de Bourjot Saint-Hilaire. 1857.

Sparrm., Mus. Carls. = A. Sparrman: Museum Carlsonianum, in quo novas et selectas Aves coloribus ad vivum brevique descriptione illustratas. 1786—89.

Steere, Coll. B. Philip. (Is.) = J. B. Steere: A List of the Birds and Mammals collected by the Steere Expedition to the Philippines. 1890.

Steph., Gen. Zool. = G. Shaw: General zoology, or systematic natural history, with plates from the first authorities and most select specimens, engraved principally by Heath. Continued by J. F. Stephens. 1800—19.

S(tr). F. = Stray Feathers. A Journal of Ornithology for India and its dependencies.

Strickl., Contr. Orn. = H. E. Strickland in W. Jardine's Contributions to Ornithology. 1848—53.

Strickl., Orn. Syn. = Ornithological Synonyms. Edited by H. E. Strickland and W. Jardine. Vol. I. Accipitres. 1855.

Studer, Reis. or Voy. Gazelle-(Reise) = Th. Studer: Die Forschungsreise S. M. S. "Gazelle" in den Jahren 1874 bis 1876. III. Theil, Zoologie und Geologie. 1889.

Sundev., Tentamen or Av. Meth. Tent. = C. J. Sundevall: Methodi naturalis avium disponendarum tentamen. Försök till fogelklassens naturenliga uppställning. 1872.

Sw(ain)s., B. W. Afr. = The Naturalist's Library. Edited by W. Jardine. Vol. XI—XII. Ornithology. Birds of Western Africa. By W. Swainson. 1837.

Sws., Zool. Illustr. = W. Swainson: Zoological illustrations, or original figures and descriptions of new, rare or otherwise interesting animals, selected chiefly from the classes of ornithology, entomology and conchology etc. 1820—23, 1829—33.

Tacz., (Faun.) Orn. Sib. Orient = L. Taczanowski: Faune ornithologique de la Sibérie Orientale. 1891—93.

T(d.) Ned. Aard. Gen(oots.) = Tijdschrift van het Kon. Nederlandsch Aardrijkskundig Genootschap, gevestigd te Amsterdam.

Temm., Coup d'Oeil génér. Possess. Néerl. = C. J. Temminck: Coup d'oeil général sur les possessions Néerlandaises dans l'Inde Archipélagique. 1846—49.

Temm., Man. d'Orn. = C. J. Temminck: Manuel d'ornithologie, ou tableau systématique des Oiseaux, qui se trouvent en Europe, précédé d'une analyse du système général d'ornithologie, et suivi d'une table alphabétique des espèces. 2e édit. 1820, 1835, 1839, 1840.

Temm., Pig. et Gall. = C. J. Temminck: Histoire naturelle générale des Pigeons et des Gallinacécs, accompagnée avec pl. anatomiques. 1813—15.

Temm., Pl. Col. = C. J. Temminck: Nouveau recueil de planches coloriées d'Oiseaux, pour servir de suite et de complément aux planches enluminées de Buffon, édit. de l'imprimerie royale 1778. Publié par C. J. Temminck et M. Laugier, Baron de Chartrouse; d'après les dessins de Nic. Huet fils et Prêtre. 1820—39.

Temm & Knip, Pig. = C. J. Temminck: Histoire naturelle générale des Pigeons avec figures en couleurs peintes, par Mme Knip, née Pauline de Courcelles. Le texte par C. J. Temminck. 1808—11.

Temm. & Schl., Faun. Jap. Aves = P. F. de Siebold: Fauna Japonica. Conjunctis studiis C. J. Temminck et H. Schlegel pro vertebratis atque W. de Haan pro invertebratis elaborata. Oiseaux. 1833.

Thienem., Fortpfl(anz.) Vög. = F. A. L. Thienemann: Fortpflanzungsgeschichte der gesammten Vögel. Mit 100 Tafeln Abbildungen von Vogeleiern. 1845—56.

Thunb., Act. Holm. = C. P. Thunberg in Kongliga Svenska Vetenskaps Akademiens Handlingar, Vol. XXXIII. 1772.

Tr. As. Soc. Jap. = Transactions of the Asiatic Society of Japan.

Tr. Chicago Ac. Sc. = Transactions of the Chicago Academy of Science.

Tr. L(inn). S(oc). = Transactions of the Linnean Society of London.

Tr. Z. S. = Transactions of the Zoological Society of London.

Tr. & Pr. N. Z. Inst. = Transactions and Proceedings of the New Zealand Institute.

Tristr., Cat. (Coll.) B. = Catalogue of a Collection of Birds belonging to H. B. Tristram. 1889.

Tunstall, Orn. Brit. = M. Tunstall's Ornithologia Britannica [1771]. Ed. by A. Newton. (Willughby Society 1880.)

Tweedd., Orn. Works = The ornithological works of Arthur, IX. Marquis of Tweeddale. Ed. by R. G. W. Ramsay. 1881.

Verh. D. Zool. Ges. = Verhandlungen der Deutschen Zoologischen Gesellschaft.

Verh. Ges. Erdkunde Berlin = Verhandlungen der Gesellschaft für Erdkunde zu Berlin.

V(erh). z.-b. Ges. Wien = Verhandlungen der k. k. zoologisch-botanischen Gesellschaft in Wien.

Verr. in Vinson's Voy. Madag. Annex B. = J. Verreaux in Vinson's Voyage à Madagascar. 1865.

Vieill., Analyse = L. P. Vieillot: Analyse d'une nouvelle ornithologie élémentaire. 1816. (Ed. by H. Saunders, Willughby Soc. 1883.)

Vieill., Enc. Méth. = Encyclopédie méthodique, ou par ordre de matière, par une société de gens de lettres. — Histoirenaturelle. Oiseaux, Ovipares et Serpents. (Oiseaux par R. J. E. Mauduit, revis. et augm. par Vieillot.) 1784—1820.

Vieill., Gall. Ois. = L. P. Vieillot: Galérie des Oiseaux du cabinet d'histoire naturelle du jardin du roi, ou description et figures coloriées des Oiseaux qui entrent dans la collection du muséum d'histoire naturelle de Paris. (Continuation de l'hist. natur. des Oiseaux dorés), dessinée (et lithogr.) d'après nature, par P. L. Oudart, et décrite par L. J. P. Vieillot. 1820—26.

Vieill., N. D. = L. P. Vieillot: Nouveau Dictionnaire d'Histoire Naturelle, 2e éd. (Articles contributed between 1816—19.)

Vig., Zool. J(ou)rn. = N. A. Vigors in the Zoological Journal. 1824—35.

Wagl., Mon. Psitt. = J. G. Wagler: Monographia Psittacorum. (Aus dem 1. Bde. der Denkschriften der Königl. Akademie der Wissenschaften in München 1832.) Besonders abgedruckt 1835.

Wagl., Syst. Av., = J. Wagler: Systema Avium. 1827.

Wald., Orn. Works = The ornithological works of Arthur, IX. Marquis of Tweeddale. Ed. by R. G. W. Ramsay. 1881.

Wall., Island Life = A. R. Wallace: Island Life: or, the phenomena and causes of insular faunas and floras. 1880.

Wall., Malay Archip. = A. R. Wallace: The Malay Archipelago. 1869.

Wallace, Geogr. Distr. Anim. = A. R. Wallace: The geographical distribution of Animals. With a study of the relations of living and extinct faunas as elucidating the past changes of the earth's surface. 1876.

Weber, Zool. Ergebnisse = Zoologische Ergebnisse einer Reise in Niederländisch Ost-Indien. Herausgegeben von Max Weber. 1890—97.

Whitehd., Expl. (Expd.) Kini Balu = J. Whitehead: Exploration of Mount Kina Balu, North Borneo. 1893.

Wieg. Arch. = Archiv für Naturgeschichte. Gegründet von A. F. A. Wiegmann.

Wiglesw., Aves Polyn. = L. W. Wiglesworth: Aves Polynesiae. A catalogue of the birds of the Polynesian Subregion (not including the Sandwich Islands). 1891. In: Abhandlungen und Berichte des Königl. Zoologischen und Anthropologisch-Ethnographischen Museums zu Dresden. 1890/91 Nr. 6.

Wilson, B. Sandw. Is. = Scott B. Wilson: Aves Hawaiiensis. The Birds of the Sandwich Islands. Assisted by A. H. Evans. 1890—96.

Z. (Ges.) Erdk., Berlin = Zeitschrift der Gesellschaft für Erdkunde zu Berlin.

Z. wiss. Zool. = Zeitschrift für wissenschaftliche Zoologie.

Zool. Garten = Der Zoologische Garten. Zeitschrift für Beobachtung, Pflege und Zucht der Thiere.

Zool. Jahrb. Abt. f. Syst. = Zoologische Jahrbücher. Abtheilung für Systematik, Geographie und Biologie der Thiere.

Ztschr. ges. Orn. = Zeitschrift für die gesammte Ornithologie.

Ztschr. wiss. Geogr. = Zeitschrift für wissenschaftliche Geographie.

NOTANDA ET CORRIGENDA.

Page *120* in Introduction, cancel the number 42, making the total 87 instead of 88.
» 4, line 30, for Forster read Forsten.
» 4, » 31, add Saleyer (Everett *a 22*) and Togian (Meyer).
» 8, » 18, 19, alter the reference-letter *b* into *a*.
» 28, » 16, instead of chocolate-brown rufous, read chocolate-brown, without rufous.
» 53, » 18, for *H. indus* and *H. indus—girrenera*, read *H. indus* and *H. indus girrenera*.
» 55, » 26, add Togian (Meyer).
» 63, » 24, add Kalao (Everett *32*).
» 77, » 4, Hartert now calls this bird *Baza subcristata subcristata* (Nov. Zool. 1898, 47).
» 79, » 11 from below, add Djampea and Kalao (Everett *g 2*).
» 90, » 5 from below, add Kalao (Everett *d 3*).
» 91, » 33, add the Osprey has been observed nesting in India by Hume and others, according to Blandford. (Faun. Br. Ind. B. III, 1895 p. 315.)
» 95, » 25, for *Ninox lugubris affinis* read *Ninox scutulata affinis*.
» 115, » 19, for D'Aubert. read D'Aubent.
» 117, » 11, add Tagulandang and Biarro —? var. (Nat. Coll.).
» 118, » 17, 18, 20, for *o 1* read *t 1* and for *n 1* read *s 1*.
» 187, » 31, correct the name into *Cuculus canorus* L., without brackets.
» 188, » 7, first reference, for Tr. Z. S. read Tr. L. S.
» 191, » 21, query summer, as Platen's collecting in Mindanao was continued into the winter months.
» 217, » 14, from below, add Djampea and Kalao (Everett *w 8*, p. 176).
» 218, » 16, for *c 2* read *c 5*.
» 219, » 12, for Wellesly read Wellesley.
» 233, » 25, for *Ramphastidae* read *Rhamphastidae*.
» 239, » 13 from below, after Elliot insert Monogr. Bucerotidae.
» 248, » 16, for Cox & Hamilt. ib. read Cox and Hamilt. Pr. L. Soc. N. S. W.
» 257, title, affix an * to *Meropogon forsteni* Bp.
» 263, » 27, add Saleyer (Weber).
» 265, » 15 from below, for Kalao read Saleyer.
» 269, » 6, for Handb. read Handl.
» 285, » 14 from below, for 1885 read 1883.
» 288, » 6 from below, add Banggai (Nat Coll.).
» 294, » 6 from below, add Saleyer and Djampea (Everett *d 23*).
» 300, title, affix an * to *Monachalcyon princeps* Rchb.
» 305, » affix an * to *Cittura sangirensis* Sharpe.
» 322, » affix an * to *Lyncornis macropterus* Bp.
» 328, line 5, for Gld., HL, read Gld., Hb.
» 329, title, before 104. *Chaetura celebensis* cancel the *.
» 335, line 6, add Kalao (Everett *13*).
» 337, » 19, add Saleyer (Everett *15*).
» 350, » 5, title, put Bp. in brackets.
» 360, » 28, add Karkellang, Talaut (Nat. Coll.).
» 389, » 15 from below, add Saleyer (Everett *14*).
» 393, » 11 from below, for *Collurincla* read *Colluricincla*.
» 400, » 18, for *S. clio* read *P. clio*.
» 407, » 6, the name *Lanius jeracopsis* is spelt *Lanius jeracopis* by de Filippi.
» 416, » 14, add Sula (Wallace).

Page 421, line 23, add Togian (Meyer *d 3*).
» 437, » 4, from below, for Luwn read Luwu.
» 440, » 22, for *carbonaria* read *carbonarius*.
» 445, title, affix an ∗ to *Dicaeum talautense* M.&Wg.
» 459, line 14, add Dongala, West Celebes (Doherty *o 1*).
» 459, » 18, erase f. 2 (♀) — this figure representing a North Celebes female (fide W. Blasius).
» 497, » 18, 19 put the names Wall., W. Blas., and Hombr. & Jacq. in brackets.
» 504, » 8 from below, title, for *Trichostoma celebensis* (Strickl.) read *Trichostoma celebense* Strickl.
» 505, » 6 for *Brachyteryx* read *Brachypteryx*.
» 513, last line, for Nat Coll. *a 25* read *a 26*.
» 525, line 6 from below, for W. Taczanowski read L. Taczanowski.
» 550, » 9, for *Munia molucca propinqua* Hart. read *Munia molucca propinqua* (Sharpe).
» 551, line 21, alter the formula *Munia molucca>propinqua* into *Munia molucca typica>*.
» 561, » 28, add Saleyer and Djampea (Everett *15*).
» 564, » 14, for *erythroprhys* read *erythrophrys*.
» 576, » 10, cancel the inverted commas in the name "La Pérouse".
» 605, » 24, for f. 2197 (read f. 1297).
» 606, title, affix an ∗ to *Ptilopus subgularis* M.&Wg.
» 616, » 14, add Djampea (Everett *20*.).
» 638, » 10, add Peling and Banggai (Nat. Coll.).
» 638, » 25, add Talaut—Lirung (Nat. Coll.).
» 671, last line, for *Tagegallus* read *Talegallus*.
» 676, line 18, for *bensteini* read *bernsteini*.
» 712, » 2 from below, read Tawaya, West Celebes, not West Tawaya, Celebes.
» 765, » 3 from below, add Togian (Meyer).
» 773, » 19 from below, read Petrop., not Petrov.
» 813, » 14, add Togian (Meyer *b 13*).
» 827, last line, add Sula (Wallace).
» 843, line 4, from below, read t. 153, instead of t. 155.
» 850, » 4, for *goisaki* read *goisagi*.
» 857, » 6 from below, add Karkellang, Talaut (Nat. Coll.).
» 884, » 1, for B. Kerguelen 1877 read 1879.
Plate XXVI read *teismanni*.

INTRODUCTION.

When we first planned a treatise on the Birds of Celebes, we soon found that it would be quite impossible to restrict ourselves to the mainland, as this is everywhere surrounded by larger or smaller islands which are so connected with it by their Avifaunas that they could not be left out; at the same time it proved impossible to define a natural zoological frontier between certain of these islands and the adjacent ones. Our frontispiece-map shows the limits we decided upon, viz. the inclusion of the Talaut Islands in the north, the Sula Islands in the east, and the Djampea Group in the south, though at each of these points elements from, respectively, the Philippines, the Moluccas, and the Lesser Sunda Islands are very marked. The boundary so chosen adjoins to the north the southern limit of the Philippines, as defined by Tweeddale, Worcester and Bourns, and others; to the east it coincides with Salvadori's western border, as drawn in his "Ornitologia della Papuasia e delle Molluche"; to the west it follows the eastern boundary of Borneo, as adopted in Everett's "List of the Birds of the Bornean Group", and by other writers; to the south it takes in all the islands between Celebes and the Lesser Sundas. The book may thus be said to fill up an ornithological gap, and the bounds as chosen appear also to be the most natural, except possibly (?) in the case of the Djampea Group. Moreover, the Avifauna of the adjacent groups often gives a clue to the derivation of non-Celebesian forms in Celebes; it would, therefore, be inadvisable to leave them out.

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1. TRAVEL AND LITERATURE.

The naturalists and collectors who have done work among the birds of this area first deserve attention, and to the following short biographical notes concerning them we append a list of the publications on the Birds of Celebes and the neighbouring islands, based more or less directly on these travellers' results. We are afraid that our lists are not complete, either in regard to its including all the names of ornithological collectors, or all items of literature. As to the latter we have restricted ourselves, with a few exceptions, to the period after the publication of Walden's "List of the Birds known to inhabit the Island of Celebes" in the year 1872, and several papers and books, which we have not enumerated in our list, though they contain something on Celebesian Birds, will be found in the synonymy of the species, if they have not been unhappily entirely overlooked.

1793. Labillardière (Jacques Julien Houton de) 1755—1834. Frenchman. Naturalist. Accompanied Dentrecasteaux' expedition in search of la Pérouse (see: Relation du voyage par le C^en^. Labillardière; an VIII [1800] vol. II, p. 298). The ships spent 18 days in passing through the strait between Buton and Muna, and parties landed upon both islands. There is no doubt that the "Pie de la Nouvelle Calédonie"(!), *Streptocitta albicollis* (Vieill.), was then obtained, as possibly also *Gazzola typica* Bp. Labillardière mentions some Parrots in these islands. Besides the above, he published many works and papers on botany, etc.

1821. Reinwardt (Caspar Georg Carl) 1773—1854. German. Naturalist. Sojourned from 1816—1822 in the East Indian Archipelago, visited about 1820 the Island of Saleyer, spent a few months in 1821 in North Celebes (see: Reinwardt's Reis naar het oostelijk gedeelte van den indischen Archipel in het jaar 1821 by W. H. de Vriese, Amst. 1858, pp. 503—538, Gorontalo; pp. 539—603, the Minahassa; with plates, 7 concerning Celebes, and the published Catalogues of the Leyden Museum). His ornithological collections are in the Leyden Museum, — see the list of Birds collected (125 species) in the work quoted (pp. 237—239) and the mention of 633 specimens of birds etc. sent home (p. 245). On p. 592 some birds of the Minahassa are recorded. As to ornithological papers he only wrote: "Uber die Art und den Ursprung der essbaren Vogelnester auf Java" (1838), but we do not know where this has been published. *Baza reinwardti*, occurring on islands south of Celebes and elsewhere, was named after him.

1828. Müller (Salomon). German (born at Heidelberg). Naturalist. Sojourned in the East Indian Archipelago from 1826—1837 and visited among other places South Celebes and the Island of Buton, see: Reizen en onderzockingen in den Indischen Archipel, 1828—1836, vol. II, 1857, pp. 4—19 (on the birds of South Celebes, pp. 7—8, 64, 69—71; of Buton, pp. 12, 15, 65, 69). This work is a new and enlarged edition of a part of the "Verhandelingen over de natuurlijke geschiedenis der Nederlandsche overzeesche bezittingen, door de leden der natuurkundige Commissie en andere schrijvers", uitgegeven door C. J. Temminck, 1839—1844, fol. His ornithological collections — about 8000 specimens — are in the Leyden Museum (see: Schlegel's Catalogues; Veth: Overzicht van hetgeen gedaan is voor de Kennis der Fauna van Ned. Ind. 1879, p. 89, etc.). *Tanygnathus muelleri* from Celebes was named after him. We have nowhere been able to find the dates of birth and death of this meritorious naturalist.

1828. Quoy (Jean René Constant) and **Gaimard** (Joseph Paul) 1790—1869 and 1796—1858. Frenchmen. Naturalists. The latter took part in the expedition of the "Uranie" and "Physicienne" (1817—1820), both in that of the "Astrolabe", 1826—1829 (see: Voyage de la corvette l'Astrolabe, Paris 1830—1834, Histoire du voyage, 1833, V, 428 by Dumont d'Urville, and Zoologie, 1830, I, 165, where 10 new species of birds from Celebes are described, by Quoy and Gaimard). They only visited the Minahassa for about 5 days in the year 1828. Temminck (Coup-d'oeil gén. s. l. poss. néerl. dans l'Inde arch. 1849, III, 105—106) said about this trip: "La relâche de la corvette française *l'Astrolabe* à la factorerie de Menado, et l'excursion d'une couple de jours faite par les naturalistes français au lac de Tondano, n'ont offert, à l'une comme à l'autre expédition scientifique, q'une recolte peu nombreuse de plantes, ainsi que la capture d'un petit nombre d'animaux. Toutefois, le naturaliste a découvert dans ces acquisitions, à peu-près autant d'espèces nouvelles à faire connaître, qu'il s'est trouvé d'objets rassemblés, presque sans choix préalable; on a été non moins surpris des résultats qu'elles ont offerts à la science." Both have written many important works on Natural History, etc.

1841. Forsten (Eltio Alegondus) 1811—1843. Dutchman. Naturalist. Was elected (1836) a member of the "Natuurkundige Commissie" in the Netherlands' Indies and sojourned in North Celebes from 1841. He could not do much, however, in consequence of bad health, and died on the 2nd of January 1843 in Amboina. Nevertheless Temminck was justified in saying (Coup-d'oeil gén. s. l. poss. néerl. dans l'Inde arch. 1849, III, 106): "Les perquisitions et les travaux auxquels il lui fut possible de se livrer, nous ont valu des additions fort intéressantes à la connaissance très-superficielle qu'on avait pu acquérir jusqu'ici de cette contrée." His ornithological collections are in Leyden (see Schlegel's Catalogues, etc.). *Meropogon forsteni*, *Halcyon forsteni*, *Pitta forsteni* and *Carpophaga forsteni* from Celebes were named after him.

c. 1844. Léclancher (Charles René Auguste) 1804—1885. Frenchman. Surgeon on several warships from 1828—1844. He visited among other places Borneo and Celebes and brought home extensive collections to the Paris Museum. When with the "Favorite" from 1841—1844 he stayed at Manado in North Celebes and got two species of birds till then unknown, one of which was named after him *Dicaeum leclancheri* (see Rev. Zool. 1845, p. 93). During a former expedition of the same ship from 1830—1832 Eydoux was the doctor on board, and in 1839 he, with Gervais, described the birds then collected in the zoological part of the work on the voyage. The "Favorite" was also out from 1838—1839 with Léclancher on board, but neither this expedition, nor the one of 1841—1844, have been described, so far as we are aware.

1856. Wallace (Alfred Russel). Born 1823. Englishman. Naturalist. Amazon 1848—52, in the East Indian Archipelago 1854—62, where especially he was most successful in every respect, none of the former nor of the later naturalists there having attained anything to equal his results. He was in South Celebes from September to November 1856, and July to November 1857, in North Celebes from June to September 1859, and his Assistant, Charles Allen, collected in the Sula Islands. As is generally known, Mr. Wallace has written specially on the Avifauna of Celebes in his various important works. His separate ornithological papers concerning the Celebesian Area are: On the Ornithology of Northern Celebes, Ibis, 1860, 140; List of Birds from the Sula Islands, P. Z. S., 1862, 333; and Note on *Astur griseiceps,* Ibis, 1864, 184; but he treated of different genera and families monographically in which the Celebes birds play a great part, e. g.: On the Parrots of the Malay Region, P. Z. S., 1864; On the habits and the distribution of the genus *Pitta,* Ibis, 1864; On the Pigeons of the Malay Archipelago, Ibis, 1865; Catalogue of the Birds of Prey of the Malay Archipelago, Ibis, 1868. His ornithological collections are for the greater part in the British Museum as the "Catalogues of Birds" show, but there are to be found in many other museums and private collections specimens from his rich harvest, amounting to 8050 specimens, as he himself mentions in the preface of his "Malay Archipelago". *Prioniturus wallacei*, *Microstictus wallacei*, *Macropteryx wallacei*, *Osmotreron wallacei* and *Chalcophaps wallacei* from Celebes, as well as *Ceyx wallacei* from Sula were named after him.

c. 1856. Riedel (Johann Gerardus Friedrich). Dutchman. Born 1832 at Tondano, North Celebes, where his father was a missionary; educated in Europe. A discourse with Alexander von Humboldt in Berlin[1]) and later Mr. Wallace's presence in Celebes appear to have had much influence in awakening his interests in Natural Science. From 1853—1883 he was in the Civil Service in the East Indian Archipelago (1853—1863 in the Minahassa, 1863—1875 in Gorontalo — both in North Celebes —, 1875—1878 in Billiton, 1878—1880 in Timor, 1880—1883 in Amboina). Many papers from his pen on North Celebes are to be found in Dutch periodicals, but his chief work is: "De sluik-en kroesharige Rassen tusschen Selebes en Papua", with many plates (1886). He made extensive ornithological and other collections everywhere, which he presented to several European Museums. His birds from Celebes are among other places at Brunswick (see: Z. f. d. ges. Orn. 1886, 81)[2]), Darmstadt (see: Abh. Naturw. Ver. Bremen V, 35, 1876, and 464, 1877), Dresden (see: our work), Karlsruhe (see: J. f. O. 1883, 129), Leyden (see: Schlegel's Catalogues, etc.), Paris (to which he presented many consignments from 1864—1872), St. Petersburg (see: Z. f. d. ges. Orn. 1886, 193)[2]). *Phyllergates riedeli* and *Ardetta riedeli* from Celebes were named after him. Dr. Riedel has been living in Holland since 1883.

c. 1860. Duivenbode (Lodewijk Diederik Hendrik Alexander van Renesse van) 1832 or 1833—1881 or 1882. Dutchman (half-caste of Ternate). Planter and merchant at Manado. Son of Maarten Dirk van Renesse van Duivenbode, whom Mr. Wallace in his "Malay Archipelago" (II, p. 2) calls the King of Ternate. He sent out native hunters to make large collections of birds in the Minahassa and the neighbouring islands and presented them in part to Museums (such as the Leyden) and sold others; consequently lots of birds from "Manado" were in the European market between 1870—1880 (see, for instance, J. f. O. 1883, p. 129), and those in many collections may be traced to this source. They

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[1]) Alexander von Humboldt asked Mr. Riedel among other things, why there are no large mammals to be found in Celebes, a question involving the whole problem which makes this island so interesting.

[2]) This collection is not from the Minahassa, as Prof. W. Blasius writes, but from Gorontalo, as we know from Dr. Riedel himself. Gorontalo does not belong to the Minahassa.

bear, however, no exact locality and date and were often mixed up with birds from other parts of the East Indian Archipelago. He appears to have been induced to collect birds from the visit of Mr. Wallace to the Minahassa in the year 1859. *Eudrepanis duivenbodei* from Sangi was named after him.

1863. Rosenberg (Karl Benjamin Hermann von) 1817—1888. German. Lived, with an interval of two years, from 1840—1871 in the East Indian Archipelago, first as soldier, then draughtsman, next in the Civil Service, finally as naturalist to the government. He travelled in North and Central Celebes from April 1863 to August 1864 and wrote concerning it: "Reistochten in de Afdeeling Gorontalo" (Amst. 1865), containing a few ornithological notes; the chapters on Celebes in his "Malayischen Archipel" (Leipsic 1878—1879) with more extensive remarks on the Avifauna (p. 270—279); and "Ein Jäger-Eldorado" (Zool. Garten 1881, 164). His determinations are, however, not throughout trustworthy, as he was more of a sportsman than of a naturalist. He also sent some hunters to the Sangi Islands in the year 1864. During his long stay in the Archipelago he made extensive ornithological collections, which now are in Darmstadt (see: Abh. Natw. Ver. Bremen, 1876, V, 35), Leyden (see Schlegel's Catalogues, etc.) and in some other Museums (e. g. Lübeck, see: J. f. O. 1877, 359; Dresden through von Schierbrand). *Strix rosenbergi* and *Gymnocrex rosenbergi* from Celebes were named after him.

1864. Bernstein (Heinrich Agathon) 1828—1865. German. Naturalist. Sojourned in the East Indian Achipelago from 1855—1865, from 1860 onwards as naturalist to the Government, and died near New Guinea. His extensive ornithological collections are in the Leyden Museum. Though he did not visit the Celebesian Area personally, except for a short stay at Macassar, he sent some of his native collectors to the Sula Islands in the year 1864 (see Schlegel's Catalogues, etc.). Bernstein's admirable ornithological papers do not concern Celebes directly. Van Musschenbroek published the diary of his last voyage to New Guinea (1864—1865) in the Bijdr. taal-, land- en volkenk. Ned. Ind. (4) VII, 1, 1883, containing much valuable information as to this lamented naturalist. *Megapodius bernsteini* from Sula was named after him.

1864. Hoedt (Dirk Samuel). Dutchman (half-caste of Amboina); secretary to the government; a passionate amateur naturalist; was nominated successor to Bernstein. He collected on Sula Besi and Sula Mangoli (1864) and on Great Sangi and Siao (1865) and forwarded his ornithological collections to the Leyden Museum (see: Schlegel's Catalogues, etc.). He died some time after 1879, but we have not been able to ascertain the year.

1865. Bickmore (Albert S.). Born 1839. American. Naturalist. In the East Indian Archipelago from 1865—1866 (see: Travels in the East Indian Archipelago, London 1868, transl. into German, 1869, and Dutch, 1873) and sojourned a short time in South Celebes (June 1865) and in North Celebes (December 1865 till January 1866). He published a list of birds collected there in the Proc. Boston Soc. Nat. Hist. as he remarks in his book, but we have not been able to find it in this Journal nor elsewhere. His ornithological collections will be in an American Museum. He now is Curator of the department of Public Instruction in the American Museum of Natural History in New York.

1870. Meyer (Adolf Bernhard). Born 1840. German. Naturalist. Travelled from 1870—1873 in the East Indian Archipelago, having been induced to go out to this part of the globe in the hope that its innumerable islands would afford the possibility of studying the variation of species in the Darwinian sense, for the publication of the "Origin of Species"

had influenced his University studies (1862—70), and he selected Celebes to begin with in consequence of Wallace's brilliant speculations on the anomalous condition of its fauna, and on the scientific problems awaiting solution there. He sojourned for over a year in Celebes: November 1870, Macassar; November—July, Minahassa and the neighbouring islands; July—September, Gorontalo, Togian and Central Celebes; September—November, South Celebes; January 1873, Macassar, Gorontalo, Kema; August 1873, Macassar. His ornithological collections from there are in Dresden, Berlin, London (British Museum: Walden Collection), etc.; they amounted to about 4000 specimens. Lord Walden treated of some of them in the Trans. Zool. Soc. vol. VIII, 1872; in the Ann. & Mag. Nat. Hist. vol. VIII 1871, IX 1872, XIV 1874; Meyer himself among other places (see "Literature") in the J. f. O. 1873, 404, where he made known that he had discovered 14 new species, and 25 which had not yet been recorded from Celebes; Rowley's Orn. Misc. 1877 & 1878; Ibis 1879 (field notes); and Abbildungen von Vogelskeletten 1879—1897. *Trichoglossus meyeri, Cyrtostomus frenatus meyeri* from Celebes, and *Halcyon meyeri* from Togian were named after him. He has translated some of Wallace's works into German and has been in charge of the Dresden Museum since 1874.

1870. Conrad (Paul). German. Captain of a trading vessel. He collected 5 species of birds at Macassar, South Celebes, in 1870, which are probably in the Bremen Museum (see: Verh. Zool.-bot. Ges. Wien 1873, 341).

1873. Fischer (Georg). German. Army Surgeon in the Dutch Indies. Collected in Celebes and Borneo and presented his ornithological collection of 1066 specimens from the Minahassa and Sangi to the Darmstadt Museum (see: Abh. Natw. Ver. Bremen V, 1876, p. 35, and t. c. 1878, p. 538). *Ptilopus fischeri* from Celebes was named after him. In 1880—1881 he was stationed at Ternate (see: Bull. Ac. Imp. des Sc. St. Pétersb. 1884 XI, p. 109).

1873. Beccari (Odoardo). Born 1843. Italian. Naturalist. Sojourned in the East Indian Archipelago from 1865—1868 (Borneo), from 1871—1876 (Moluccas, Celebes, New Guinea), from 1878—1879 (Sumatra), and as a scientific collector takes almost equal rank with Wallace. In 1873—1874 he visited the South-eastern Peninsula of Celebes, as well as the Minahassa and Macassar, and Count Salvadori has described his ornithological collections from there, now in the Genoa Museum (see: Ann. Mus. Civ. di Stor. Nat. di Gen. 1875, VII, 641). *Aethopyga beccarii* and *Turnix beccarii* from Celebes were named after him. He lives at Radda in Chianti near Florence.

1874. Bruijn (Antonius Augustus). Dutchman. He was an officer in the Dutch Navy, but settled on Ternate as son-in-law of the great merchant M. D. van Renesse van Duivenbode (mentioned above p. *4*), whose business he carried on after his death. He sent out hunters with many of his ships and sold the bird-skins collected chiefly in Paris to plumassiers, but a large and highly valuable collection was presented by him to the Genoa Museum, containing among others a series from North Celebes and Sangi (see: Ann. Mus. Civ. Gen. 1875, VII, p. 641; ib. 1876, IX, p. 50). He died about the year 1880.

1875. Musschenbroek (Samuel Cornelius Jan Willem van) 1827—1883. Dutchman. Naturalist. In the Civil Service of the Dutch Indies from 1855—1877, including a two-years' furlough in Europe. He was Resident of the Province of Manado from 1875—1876. Here he collected ornithologically, as indeed he did in all branches of Natural History wherever he was stationed (Java, Ternate), sending his collections to the Museums of the Netherlands. He presented (1879) part of his North Celebesian birds to the Dresden Museum, others to Leyden (see: Notes of the Leyden Museum 1879, I, p. 50). He published some remarks on

the birds of North Celebes (Nat. Tijdschr. Ned. Ind. 1877, XXXVI, p. 376), and amongst his other works we may mention here his large map of the Minahassa (1878, $\frac{1}{100\,000}$) and that of the Gulf of Tomini and the lands adjoining (1879). As to his sojourn in the Minahassa, see also Rowley's Orn. Misc. 1878, III, p. 115. As a gentleman of high scientific attainments he offered great help to all naturalists visiting the East Indian Archipelago. *Surniculus musschenbroeki* from Batjan, now also known from Celebes, was named after him.

1875. Murray (John). Born 1841. Scotsman (Canada). Naturalist on the "Challenger" under whose superintendence the ornithological collections were formed, and of whose note-book, and of further notes, Mr. Sclater made use in his Report (see: "The Voyage of H. M. S. Challenger" 1873—1876, Zoology vol. II, part VIII, 1880). There is, however, only one species recorded belonging to our area, viz. a Lory from Melangis[1]), one of the Nanusa Islands (l. c. p. 115) to the north of Celebes. Specimens are in the British Museum. This bird was afterwards named *Eos challengeri*. Dr. Murray lives in Edinburgh as Director of the Scottish Marine Station for Scientific Research and is a member of the Fishery Board for Scotland.

1875. Bültzingslöwen (Wulf von). Born 1847. German. Sportsman. He travelled in the Minahassa in the year 1875 and brought together there a small collection of birds, which he presented to the Lübeck Museum (see: J. f. O. 1877, 359). Lives near Berlin.

1876. Faber (F. von). Dutchman. In the Civil Service of the Dutch Indies. He collected bird-skins in the Minahassa where he stayed at Amurang in the year 1876, and presented collections among others to the Dresden and Berlin Museums (as to the latter, see J. f. O. 1877, 217, and 1883, 121). Subsequently (1881) he collected ornithologically in Sumatra also. Died after 1886.

1876. Teijsmann (Johannes Elias). 1808—1882. Dutchman (of German origin). Naturalist. Lived at Buitenzorg in Java, from 1830 till his death, as Botanist and as Honorary Inspector of the Plantations. He made an official voyage in 1876 to the Moluccas and visited Sula Besi (see Nat. Tijdschr. Ned. Ind. 1877, XXXVII, p. 88); in 1877 another (besides various journeys in the Archipelago not mentioned here) to South Celebes and Saleyer (l. c. 1879, XXXVIII, p. 54), and on these occasions he collected birds among other objects. In Celebes he procured (t. c. p. 121) "893 specimens of skins of mammals, birds, etc. in 254 species". His reports also contain some ornithological notes. He visited Macassar, Pankadjene, Tjamba, Maros, Bonthain and Loka in South Celebes and Saleyer Island, but a full description of his valuable ornithological collection sent to the Leyden Museum was never given. *Rhipidura teijsmanni*, *Pachycephala teijsmanni* and *Cyrtostomus teijsmanni* were named after him (s. Notes Leyden Museum 1893, XV, pp. 167, 170, 179). In the year 1860 he had also visited the Minahassa on a short trip together with Prof. de Vriese, who died soon afterwards. (See l. c. 1861, XXIII, pp. 343—369.)

1878. Platen (Carl Constantin). Born 1843. German. Naturalist. Was a physician at Amoy, then collected, chiefly ornithologically, with a short interval in Europe in the year 1879, in 1878 in South Celebes, 1884 in Malacca, Borneo, the Moluccas and Waigiou, 1884—1886 in the Minahassa, North Celebes, 1886—1887 on Great Sangi, 1887—1892 in the Philippines, 1892—94 on Batjan. The greater part of his collections were sold to the Brunswick Museum and to Mr. Nehrkorn's Museum at Riddagshausen near Brunswick;

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[1]) We write Melangis, instead of Meangis, as the former name is on the best Dutch maps.

other specimens to different museums and collections in Germany and abroad. Dr. Platen himself wrote about his trips in Celebes and Sangi in the "Gefiederten Welt" 1879, pp. 358, 378; 1887, 193, 264. His birds from Celebes and Sangi were carefully described by Prof. W. Blasius in the Z. ges. Orn. 1885, 201 (S. Celebes, 1878); Ornis 1892, IV, 527 (Sangi, 1886); and Festschr. Vers. Naturf. Braunschw. 1897, p. 277 (N. Celebes, 1884—1886). *Aramidopsis plateni,* and *Cyrtostomus plateni* from Celebes were named after him, and *Criniger platenae* after Mrs. Platen, who has always accompanied her husband. He lives at Barth (Prussia).

c. 1880. **Laglaize** (Léon). Frenchman. Collecting Naturalist. Made extensive expeditions in the East Indian Archipelago and sojourned about 1880 in Celebes and Sangi; his ornithological collections from there are in the Paris and some other museums.

1882. **Ribbe** (Carl) and **Kühn** (Heinrich). Born 1861 and 1860. Germans. Collecting naturalists. They made an expedition together in the East Indian Archipelago from 1882—1885, and visited South and East Celebes in 1882—1883, North and West Celebes (on a short trip) in 1885; the island of Banggai and East Celebes for the second time were visited by Mr. Kühn alone in 1884—1885. Part of their ornithological collections from Celebes came to the Dresden Museum (see Sitzb. Ges. Isis, Dresden, 1884, Abh. 1, pp. 16, 48); for a general report on this voyage and on a second to the Bismarck Archipelago and Solomon Islands (1892—1896) by R. alone, see: Deutsche geogr. Blätter 1895, vol. 18, p. 372. Concerning Celebes Mr. Ribbe has published: "Ein Sammeltag am Wasserfall von Maros" (see Krancher's entomolog. Jahrb. 1893). He is living near Dresden; Mr. Kühn at Tual in the Kei Islands as owner of a steam saw-mill.

1883. **Guillemard** (Francis Henry Hill). Born 1852. Englishman. Naturalist. Visited North and South Celebes, 1883, during the "Cruise of the Marchesa to Kamtschatka and New Guinea" (1886, p. 153—215: Chapter on Celebes, where there are some notes on birds) and described his ornithological collections in the Proc. Zool. Soc. of London 1885, 542. He collected 108 species in Celebes, 3 of which had not been recorded before from there, though from elsewhere. These are mostly in the Tring Museum. Dr. Guillemard has also travelled in Lapland and in Africa, and is now living in England at Trumpington near Cambridge.

1885. **Hickson** (Sydney John). Born 1859. Englishman. Naturalist. Made scientific researches in North Celebes, Sangi and Talaut in 1885 to 1886 and gave some notes on the birds there (see: "A Naturalist in North Celebes", 1889, Appendix B, p. 360). His ornithological collections, which are, however, small, are in the Cambridge Museum. He now is Professor of Zoology at the Owens College, Manchester.

1888. **Weber** (Max Carl Wilhelm). Born 1852. German. Naturalist. Professor of Zoology at Amsterdam. During an exploring expedition in the East Indian Archipelago (1888—1889) he visited South and Central Celebes and the Island of Saleyer, and procured 97 species of birds in 234 specimens in Celebes (of which, however, only 2 species of wide distribution were as yet unknown from the island) and 14 species in 22 specimens in Saleyer. These collections are partly in the Leyden Museum, partly in the Zoological Museum of the University of Amsterdam. (See: "Zoologische Ergebnisse einer Reise in Niederländisch Ost-Indien", 1894, III, p. 269.)

1890. **Radde** (Gustav Ferdinand Richard). Born 1831. German. Naturalist. Accompanied two Russian Grand-dukes on a voyage to the East and visited the Island of

Buton and South-east Celebes in 1890. He has not published a report on the ornithological collections made here, unless it be in the work brought out by the Grand-dukes in Russian. A chapter of this work, from the pen of Dr. Radde, on Buton and South Celebes appeared in German in the journal "Globus" 1896, vol. 69, p. 151, wherein are some ornithological notes (s. pp. 172, 189), but the determinations are not trustworthy, and have, therefore, not been quoted in this book. Dr. Radde is Director of the Museum of Tiflis, where, or elsewhere in Russia, this collection may now be.

1892. Cursham (Charles W.). Dutchman (half-caste of Celebes). Merchant at Manado, North Celebes, who had collected birds there before 1892, which may be in some museum. Was engaged by Dr. Meyer and the Hon. W. Rothschild to form another collection and sent out native hunters from 1892—1896 to some parts of the Minahassa and the small neighbouring islands, and to the Sangi, Talaut and Banggai Groups (see: J. f. O. 1894, 237, and Abh. Ber. Mus. Dresden 1894/5 Nr. 4, Nr. 9; 1896/7 Nr. 2). In our work specimens from this source are marked: "native collectors" or "native hunters" ("nat. coll.", "nat. hunt.") and some of these skins have passed into other museums also.

1893. Sarasin (Paul and Fritz). Born 1856 and 1859. Swiss. Naturalists. The cousins Sarasin spent the years 1884—1886 in Ceylon and published the results of their investigations in the great work entitled: "Ergebnisse naturwissenschaftlicher Forschungen auf Ceylon" (1887—1893). From 1893—1896 they were in Celebes, viz. 1893—1894 in North Celebes, 1895 in central parts, 1895—1896 in the South (see: Zeitschr. Ges. Erdkunde Berlin 1894, XXIX, 351; 1895, XXX, 226, 311; 1896, XXXI, 21; and Verh. Ges. Erdkunde Berlin 1896, 337; with 5 maps). No naturalists before them have made such a thorough and many-sided exploration of the Island, and contributions of the highest importance are to be expected from their pen, for as yet they have only begun to publish some of their results. They collected in nearly every branch of Natural History and Ethnography, and we had the privilege of receiving their ornithological specimens in 9 different consignments during the time we were writing this book (see: J. f. O. 1894, 153; Abh. Ber. Mus. Dresden 1894/95, Nr. 4 and Nr. 8; 1896/97, Nr. 1), which has reached a much higher standard through their welcome aid, as may be seen on almost every page. We are, therefore, deeply indebted to Dr. P. & Dr. F. Sarasin. They obtained 207 species on the mainland of Celebes, 10 of which proved to be new to science and 12 others not yet known from Celebes. Their ornithological collections are for the most part in the Museum at Basel, where they live; they also presented some valuable specimens to the Dresden Museum. *Myza sarasinorum, Zosterops sarasinorum* and *Cryptolopha sarasinorum* were named after them.

1894. Kükenthal (Willy). Born 1861. German. Naturalist. When on his exploring expedition into the East Indian Archipelago from 1893—1894 spent a few weeks (in June and July 1894) in North Celebes and collected some birds there, which are now in the Senckenberg Museum at Frankfort. Dr. Kükenthal is Professor of Zoology at Jena.

1895. Everett (Alfred Hart). Born 1848. Englishman. Naturalist. Has collected birds, etc., beginning about 1870, in the East Indian Archipelago, viz. in Borneo (see his "List of the Birds of the Bornean Group of Islands": J. Str. Br. R. As. Soc. 1889, Nr. XX), the Philippines (see Ibis 1872, and Proc. Zool. Soc. 1877—1879), Natuna, Savu, Lombok, Timor, etc. (see Novit. Zool. 1893 and 1896), and visited South Celebes and the islands to the south in 1895 (see Novit. Zool. 1896, pp. 69, 148, 256; 1897, 170). His ornithological collections are chiefly in the British and Tring Museums, but many of his duplicates are to be found elsewhere, for instance, in the Dresden Museum. *Androphilus everetti* from South Celebes,

Pachycephala everetti and *Monarcha everetti* from the Island of Djampea were named after him. He has been during most of this time in the Sarawak Government Service, and now resides in Labuan, when not engaged in zoological collecting.

1895. Hose (Charles and Ernest). Born 1863 and 1872. Englishman. Visited the Minahassa, on a collecting trip in 1895. Charles, the elder brother, had already explored the mountainous parts of North Borneo and made extensive collections there; he has written about the mammals and birds of Borneo (1893). He is in the service of the Rajah of Sarawak, as Resident of the Province of Baram. *Dicaeum hosei* from Celebes was named after him. Ernest Hose also lives in Sarawak, when not engaged in collecting work.

1896. Doherty (William). American from Cincinnati. Naturalist. He has travelled extensively for many years in Europe, Persia, India and the East Indian Archipelago and visited South Celebes in 1887 and 1891, South and West Celebes (Palos Bay) in 1896, Talaut in 1892 and Sula in 1898. His ornithological collections are chiefly in the Tring Museum (see: Nov. Zool. 1896, 153). *Pitta dohertyi* from Sula was named after him, this species, however, could not be treated of in our book, as it was not described until after we had finished. He is highly distinguished as a linguist and entomologist and has written a great deal on Lepidoptera from India. He is still travelling in the East.

1897. Waterstradt (Johannes). Born 1869. Dane. Collecting naturalist. Has made extensive expeditions in Ceylon, Malacca and the East Indian Archipelago (chiefly Borneo) since 1888 and sent his Bornean hunters to the Talaut Islands in 1897. The ornithological collections of this expedition are in the Tring Museum (see: Nov. Zool. 1898, 88). He is still collecting, and is settled for the moment in Labuan.

Special List of Literature on the Birds of Celebes.[1])

1850. Gould J. The Birds of Asia. 1850—1883. 7 vols. folio (completed by R. B. Sharpe).
1857. Schlegel H. Handleiding tot de beoefening der dierkunde. Vol. I 1857. 530 pages. 8 plates in folio.
1860. Wallace A. R. On the ornithology of Northern Celebes. Ibis p. 140—7.
1862. Schlegel H. Muséum d'Histoire Naturelle des Pays-Bas. Revue méthodique et critique des collections. 1862—1880. 7 vols. and 1 vol. Index by F. A. Jentink.
1862. Wallace A. R. List of Birds from the Sula Islands (east of Celebes), with descriptions of the New Species. P. Z. S. p. 333—46. Plates XXXVIII—XL.
1863. Schlegel H. De Vogels van Nederlandsch Indië (Pitta, Ijsvogels, Valkvogels). 1863—1866. 3 parts 4°. 185 pages, 50 plates.
1864. Wallace A. R. Note on Astur griseiceps, Schlegel. Ibis p. 184, plate V.
1865. Finsch O. Neu-Guinea und seine Bewohner. 185 pages. (On p. 154—85 list of Birds including Celebes.)
1866. Schlegel H. Observations Zoologiques I. Ned. Tijdschr. Dierk. III p. 181—213.
1868. Bickmore A. S. Travels in the East Indian Archipelago.
1868. Sharpe R. B. A monograph of the Alcedinidae. 1868—1871. 4°. LXXXII + 304 pages, 120 plates.
1869. Wallace A. R. The Malay Archipelago. 2 vols. XXIV + 1002 pages. (German edition by A. B. Meyer, in the same year.)
1871. Meyer A. B. Brief über Merops Forsteni von Celebes. J. f. O. p. 231—2 (translated in Gould's Birds of Asia vol. I pl. 39 1873).
1871. Walden A. On a new species of Trichoglossus (T. Meyeri) from Celebes. Ann. Mag. Nat. Hist. (4) VIII p. 281—2.
1872. Cabanis J. [Note on Oriolus formosus n. sp.] J. f. O. p. 392—3.
1872. Walden A. Description of a supposed new species of Cuckoo from Celebes. Ann. Mag. Nat. Hist. (4) IX p. 305—6.
1872. Walden A. On some supposed new species of Birds from Celebes and the Togian Islands. Ann. Mag. Nat. Hist. (4) IX p. 398—401.

1872. Walden A. A List of the Birds known to inhabit the Island of Celebes. Tr. Z. S. VIII p. 23—108, Plates III—X. 4to.
1872. Walden A. Appendix to a List of Birds known to inhabit the Island of Celebes. Tr. Z. S. VIII p. 109—98, Plates XI—XIII.
1873. Cabanis J. [Note on Gerygone flaveola n. sp.] J. f. O. p. 157—8.
1873. Finsch O. und P. Conrad. Ueber eine Vogelsammlung aus Ostasien. Verh. Zool.-bot. Ges. Wien p. 341—61 (5 species from Celebes).
1873. Meyer A. B. Notiz über die Vögel von Celébes. J. f. O. p. 404—5.
1873. Pelzeln A. v. [Liste von Vögeln grösstentheils aus Celebes.] Verh. Zool.-bot. Ges. Wien p. 10 of sep. copy.
1873. Sharpe R. B. On three new species of Birds. P. Z. S. p. 625—6 (1 new species from Celebes).
1874. Walden A. Descriptions of some new species of Birds. Ann. Mag. Nat. Hist. (4) XIV p. 156—8 (1 new species from Togian).

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[1]) Where not otherwise specialized the book is octavo.

1874. Sharpe, Seebohm, Sclater, Gadow, Hartert, Grant, Hargitt, Salvadori, Salvin, Saunders: Catalogue of the Birds in the British Museum. 27 volumes. 1874—1898.

1875. Gould J. The Birds of New Guinea and the adjacent Papuan Islands. 1875—1888. 5 vols. folio (completed by R. B. Sharpe).

1875. Gurney J. H. Notes on a "Catalogue of the Accipitres in the British Museum". Ibis p. 87 et seq. (These notes continue till 1882 and contain remarks on many of the Birds of Prey of Celebes.)

1875. Meyer A. B. [Ueber Coryllis.] Gef. Welt IV p. 229—30.

1875. Meyer A. B. Ornithologische Mittheilungen I. Mitth. Zool. Mus. Dresden vol. I p. 19. 4to.

1875. Murray J. Voyage of H. M. S. Challenger. Zoology vol. II part VIII p. 115. 4to.

1875. Pelzeln A. v. Africa-Indien. Verh. Zool.-bot. Ges. Wien p. 33—62.

1875. Salvadori T. Intorno a due collezioni di uccelli di Celebes inviate al Museo civico di Genova dal Dr. O. Beccari e dal Sig. A. A. Bruijn. Note. Ann. Mus. Civ. di Stor. Nat. di Genova VII p. 641—81, Tav. XVIII.

1876. Brüggemann F. Beiträge zur Ornithologie von Celebes und Sangir. Abh. Naturw. Ver. Bremen V p. 35—102, Taf. III—IV.

1876. Koch G. v. Verzeichniss einer Sammlung von Vogelbälgen aus Celebes und Sanghir, welche vom Grossherz. Zoologischen Museum zu Darmstadt im Tausche oder gegen Baarzahlung zu erhalten sind.

1876. Pelzeln A. v. Ueber eine . . . Sendung von Vogelbälgen. Verh. Zool.-bot. Ges. Wien p. 716—20, Taf. XIII.

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1876. Salvadori T. [Letter on Celebes Birds.] Ibis p. 385—6.

1876. Shelley G. E. A monograph of the Nectariniidae or family of Sun-Birds. 1876—1880. CVIII + 393 pages, 121 plates. 4to.

1876. Wallace A. R. The Geographical Distribution of Animals. 2 vols. XXXII + 1108 pag. (German edition by A. B. Meyer, in the same year.)

1877. Brüggemann F. Nachträgliche Notizen zur Ornithologie von Celebes. Abh. Naturw. Ver. Bremen V p. 464—6.

1877. Lenz H. Mittheilungen über malayische Vögel. J. f. O. p. 359—82.

1877. van Musschenbroek S. C. J. W. Jets over de Fauna van Noord-Celebes en zijne naaste omgeving. Nat. T. Ned. Ind. XXXVI p. 376—84.

1877. Reichenow A. [Note on Birds from Celebes.] J. f. O. p. 217—8.

1877. Rowley G. D. [and A. B. Meyer]. Broderipus formosus (Cab.). Orn. Misc. II p. 227—9, plate LVI. 4to.

1877. Rowley G. D. [and A. B. Meyer]. On a few species belonging to the genus Loriculus. Orn. Misc. II p. 231—54, plates LVII—LX. 4to.

1877. Rowley G. D. [and A. B. Meyer]. On the Genus *Pitta*. Orn. Misc. II p. 259—69, 321—3, plates LXII, LXIV—V. 4to.

1877. Salvadori T. Intorno alle specie di Nettarinie della Papuasia, delle Molucche e del gruppo di Celebes. Note. Atti d. R. Acad. Sc. Torino XII p. 299—321.

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1878. Rowley G. D. [and A. B. Meyer]. Domicella coccinea (Latham). Orn. Misc. III p. 123—9, plate XCVIII. 4to.
1878. Rowley G. D. [and A. B. Meyer]. On the genus Cittura. Orn. Misc. III, p. 131—43, plates XCIX—CII. 4to.
1878. Salvadori T. Descrizione di trentuna specie nuove di uccelli della sotto regione papuana, e note intorno ad altre poco conosciute. Ann. Mus. Civ. Genova XII p. 317—47.
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1879. Schlegel H. On Strix inexpectata. Notes Leyden Mus. I p. 50—2.
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1880. Frenzel A. [and A. B. Meyer]. Ueber Fledermauspapageien (Gattung Coryllis). Monatsschr. D. Ver. Schutze Vogelwelt p. 8—28, with plate.
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1880. Meyer A. B. [Letter on Streptocitta torquata and caledonica.] Ibis p. 249 and 373.
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1881. Blasius W. Ueber eine Sendung von Vögeln aus Nord-Celebes. Braunschweigische Anzeigen Nr. 247 (newspaper!) and Gef. Welt p. 534.
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1884. Dresser H. E. A monograph of the Meropidae. 1884—1886. XX + 144 pages, 34 plates. Folio.
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2. SEASONS AND WINDS IN THE EAST INDIAN ARCHIPELAGO.

See Maps III and IV.

The red colour on the maps denotes "fine season", the blue colour "rainy season", while purple distinguishes districts where it would be incorrect to term the period either wet or fine. The arrows fly with the wind. The short arrows distributed over the Archipelago show the persistence of the wind in the given direction (those grouped 5 mm apart denoting 50 per cent of the winds as coming more or less directly from the quarter indicated, those 4 mm apart denoting 60 per cent, and so on). The long arrows, chiefly outside the Archipelago, demonstrate the prevailing direction of the wind during the six months concerned, without reference to percentage.

It should be observed that our sketch-maps are more or less arbitrary and hypothetical, for data have not been accurately recorded from all parts, and others are hidden in papers in periodicals or in special works, and were not consulted, as lying too far from the aims of this book. We have been obliged to satisfy ourselves with an approximately correct picture of the winds and rains of the Archipelago, and this remark refers both to the arrows on our maps and to the colours. The general results and general points of view of our reasoning will not be greatly affected, even if some one should prove that there are faults here and there in our maps, which we are very ready to concede.

Among the many causes which effect the dispersal and the distribution of birds (cf. A. R. Wallace, Geogr. Distr. Anim. vol. I, chap. III, 1876), winds and seasons play an important part — the winds directly by carrying birds involuntarily to new lands, or in offering barriers to their wandering across certain zones; the seasons indirectly by their influence upon the abundance or scarcity of food, which forms the strongest of several motives for migration and local movements. In temperate and cold climes the alternation of the seasons, summer and winter, is, as it were, accompanied by a flow and ebb of vital energy in the vegetable kingdom expressed in the sprouting of foliage and the fall of the leaf of deciduous trees, and, at the approach of the cold season, insects, such as feed upon leaves and flowers, etc., hibernate or perish with the disappearance of their food, seeds and grain are buried or hidden under snow, molluscs and

batrachians hibernate; consequently, most insectivorous, granivorous and other birds betake themselves at this season to warmer latitudes, the majority invading the countries and islands of the tropics, where specimens often fall to the gun or blow-pipe of the collector, sometimes to be named as new species or subspecies by learned ornithologists at home. Amongst the endemic birds of tropical countries, such as the East Indian Islands, periodic wanderings across the sea are very rare (though not unknown amongst certain Pigeons); the birds do not as a rule shift their quarters in an extensive manner, for they have not far to go to find the needed food, since one side of an island often has its dry season when the other has its wet one, and the highlands in general an entirely different climate from that of the districts near the sea-shore or the plains. Birds, therefore, need not cross the sea to find new feeding-grounds; it is probable however that local movements, depending upon the ripening of certain fruits or blossoming of flowers (see, for instance in the text, Meyer's observations on some small Parrots in Celebes, pp. 122, 150, 159) are common, and the food-supply seems to be regulated by the season. The seasons are determined in the East Indies by the monsoons, the monsoons themselves by the position of the sun over the greater masses of land.

Monsoons of the East Indian Archipelago. — In consequence of the superior power of the sun about the equator, the heated atmosphere there rises, and an indraught of the cooler air from the north and the south flows in to supply its place, taking the form of N.E. and S.E., instead of due North and South, winds, owing to the rotation of the earth. These are the Trade-winds, which blow with a general regularity from year's end to year's end over most of the Pacific and over parts of the other great Oceans. The return of the rising equatorial air through higher strata towards the north and south, its meeting in the upper atmosphere with high N.E. and S.E. Trade-winds blowing from the Poles, their stopping one another, piling up and descending to the globe about lat. 30°—35° N. and S., giving rise to a high barometer and zones of calms (cf. Maury, Phys. Geogr. Sea, 14th ed. 1869 p. 80), the starting from these belts of the true Trade-winds and of low winds returning towards the Poles, are questions upon which the meteorologist may be consulted, but which need not further concern the weather-chart of the Archipelago. Here, there are four principal winds, two north of the equator and two south of it, which blow alternately throughout the year generally speaking without much interruption, except at the periods of the shifting of the winds, the N.E. and S.E., which blow each for about half a year, when they are displaced by other winds, the true Monsoons.

The South-west Monsoon. — When the sun in the Northern Hemisphere draws towards the Tropic of Cancer (our summer), the plains and table-lands of Asia become greatly heated[1]), and the N.E. Trade-wind, instead of continuing

1) "L'été de Pekin, qui est sous le quarantième degré de latitude, donne une moyenne de chaleurs égale à celle du Caire (30° lat.), et son hiver, une moyenne de froids égale de celle d'Upsal (60° lat.)" (David, N. Arch. du Mus. 2e sér., 1885, VIII, 5).

to blow towards the parts of the Indian Ocean and islands about the equator, now no longer the hottest quarter, stops, and, turning back, commences to move towards the heated Continent as the S.W. Monsoon. This wind is general from about April to October in the Indian Ocean and the East Indian Archipelago north of the equator, sometimes extending as far east as the Marianne Islands and as far north as the south of Japan.

The South-east Monsoon. — During the time that the sun continues north of the equator and the South-west Monsoon is blowing, the S.E. Trade-wind in general has free course in the Southern Tropics, and from April to October is the wind of the East Indian Archipelago south of the equator, where it is commonly spoken of as the South-east Monsoon. The general direction of it and of the S.W. Monsoon of the Northern East Indies is shown on Map III.

The North-east Monsoon. — When the sun, at the autumnal equinox, passes into the southern hemisphere, the N.E. Trade-wind reasserts itself in the parts where it has had to give way to the S.W. Monsoon, and, displacing that wind, it blows from some time in October, to April. It is then the prevailing wind of the Archipelago north of the equator.

The North-west Monsoon. — At this time of the year, in the zone of calms about the equator between the N.E. and S.E. Trade-winds, a westerly monsoon, unaccountable to meteorologists at the time of Maury's celebrated work (1869), sets off and blows in a narrow, curved belt across nearly the whole width of the great oceans; much, one may suppose, as the return current flows back towards the buttresses of the bridge under which a swift river passes. Out of this belt there arises the N.W. Monsoon of Australia and the East Indies south of the equator. Corresponding with the S.W. Monsoon of the north of the equator, the N.W. Monsoon evidently is originated by the heating of the interior of Australia and New Guinea during the southern summer, and it is the prevailing wind throughout the Archipelago from the equator southwards during the period October to April. See Map IV.

The Rains: north of the equator. — Between April and October the S.W. Monsoon, arising in the Indian Ocean about the equator or to the south of it near Sumatra, reaches the northern half of that island saturated with moisture and produces the rainy season there and along the west coast of the Malay Peninsula. The mountain-ranges running through the middle of that peninsula probably hold back the clouds, for, as the wind passes over the east coast, it is the fine season there, though there are occasional showers. In the Gulf of Siam the wind again commences to take up moisture; here, during the cruise of H. M. S. "Saracen" between 1855—58 a rough sea was experienced at this time of year, and, on the opposite coast "strong breezes with much rain and occasionally a fresh gale" (Direct. Ind. Arch. 1870 p. 17). Cambodia and the neighbouring parts of Siam have then their wet season. Further east the wind, passing over the middle of Sumatra and gathering vapour afresh in the south part of the

China Sea, brings the season of most rain to Borneo north of the equator, though the climate of that country is moist at all times of the year. The Sooloo Islands and the southern and western parts of the Philippines have now their rainy season. See Map III.

During the other half-year, October to April, the N.E. Monsoon is operative and reverses the work of the S.W. Monsoon. Laden with moisture taken up in the Pacific it deposits much of it on the northern and eastern parts of the Philippines, and, on arriving in Borneo north of the equator, does not bring with it so much rain as the S.W. Monsoon. In the Siamese Peninsula, Annam, facing the wind, now has plentiful rains, but on the opposite side Siam and Cambodia have their finest time of year: "at this time the sky is frequently unclouded for a week together", but the wind again becomes saturated in passing over the Gulf of Siam, and on the opposite coast along the eastern shore of the Malay Peninsula "the weather is wet and stormy".

The Rains: south of the equator. — In the parts of the Archipelago lying south of the equator the S.E. Trade-wind — here called the S.E. Monsoon — is the prevailing wind from April till October. Blowing from out of the arid deserts of Australia, it leaves the north coast of that country hot and dry, and has not time to take up much vapour before it reaches Timor and the chain of islands stretching between there and Java. Consequently these islands have now their dry season, and the vegetation of Timor — which country is probably the driest of all — is said by Wallace to have an aspect strikingly similar to the Australian. Before reaching the west end of Java the S.E. Monsoon, having passed over a wide stretch of ocean, has gathered moisture, and this part of the island now receives ample quantities of rain, though not in such abundance as is the case there during the returning N.W. Monsoon, which is the bad season, and the vegetation here is consequently most luxuriant. The same holds good even in a still greater degree for the west coast of Sumatra south of the equator, where there is still less difference between the two seasons. During this Monsoon it is also the fine season in South Borneo and in almost the whole of Celebes; but further east this is now no longer the case. The winds that reach the shores of the Gulf of Tomaiki in East Celebes, the southern coasts of Buru and Ceram, the Islands of Kei and Aru, the S. W. Coast of New Guinea, etc., pass from the South Pacific Ocean either through the Torres Straits or over the Cape York Peninsula across the Gulf of Carpentaria; thus, there are no broad lands in the way to receive their moisture until they reach the above-mentioned territories, which now have their rainy season. The high mountain-chains of New Guinea and the ranges which intersect the islands of Ceram and Buru serve to retain the clouds brought up by this Monsoon, and here again occurs the phenomenon of the rainy season on the south side of an island and the fine season on the north.

These conditions are reversed during the counter Monsoon, the N.W. Monsoon, which predominates from October to April in the Archipelago south of the

equator, and the lands, which had their dry season before, now get their wet one, and those, which then had their rainy season, now have their fine one. Though easy to be understood, this alternation of the seasons is often not a little striking. See Map IV.

Professor van der Stok of Batavia recognises 4 different types of Monsoons in the East India Archipelago, about which he has most obligingly sent us (in lit.) the following particulars.

"There are various types of Monsoons in the Indian Archipelago:

"First, the perfectly regular, the S. E. Trade-wind, or the S. E. Monsoon blowing out of Australia, which prevails in the southern parts of the Archipelago from April till October, characterized by dry weather (instances: Java, Bima in the Lesser Sunda Islands, Macassar, S. Celebes, and Banjermassin, S. Borneo); while from October to April the heavily saturated West Monsoon is in force.

"A second type is found, as your map[1]) also shows accurately, in South and Middle Sumatra, especially on the west coast, and in the middle portion of Borneo, where all through the year a tolerably equal quantity of rain descends (instances: Padang, Siboga, Sintang, Singapore). For these conditions also your map is suitable.

"It is otherwise with the third type, of which examples in North Sumatra and North Borneo are recorded. Here it is not possible to divide the year into two halves in such a manner that the one contains the dry, the other the wet season. (See below p. *29* under Borneo.)

"Finally a fourth type is found in the eastern parts of the Archipelago where, as in Amboina, Saparua, etc., the Monsoon-periods — at least on the south side of the Island — are exactly reversed [as compared with the first type], as your map also shows. As a whole Celebes also lies under the southern Monsoon-division, for in North Celebes there is still to be found only a trace of the February minimum whereby North Sumatra and North Borneo are characterized".

Change of climate at different altitudes. It is probably always the case that the highlands of tropical islands have a very different climate from the coasts and plains. In April, 1871, when the fine season had begun at Manado, Meyer could not start for the mountains of the Minahassa, as the rainy season was still going on there. The following table shows this:

	Average of years	April mm	May mm	June mm	July mm
Masarang (highlands)	15	256	249	228	135
Manado (coast)	17	205	167	179	125

In Java where meteorology has been much more thoroughly studied than elsewhere in the Archipelago, Dr. J. J. de Hollander (Handl. Land- en

[1]) An original MS. map, since revised and modified.

Volkenk. Ned. Oost-Ind. 1882, 4th ed. vol. I pp. 178—181) describes four different climates peculiar to different altitudes — climates having not only differences of temperature, but also of winds and rains. As the existence of such have great influence upon bird-life we translate his remarks:

"The climatic conditions of Java are very varied, and especially dependent upon the altitude, as well as upon the Monsoons. In respect of this the surface of Java may be divided into four zones or belts: the First, or Hot Zone extending from the sea-level up to 2000 feet; the Second or Temperate Zone from 2000 to 4500 feet; the Third or Cool Zone from 4500 to 7500 feet; and the Fourth or Cold Zone from 7500 to 10000 feet and upwards.

"In the First or Hot Zone the mean temperature is 29·7° C. (85·5° F., 23·8° R.) on the strand and 24·2° C. (75·5° F., 19·3° R.) on the upper boundary. At Batavia the greatest heat is experienced in April, the least in January; the nights and mornings are, however, coolest from June to August. In this Zone the atmosphere is very damp. This dampness naturally increases as one descends from a higher level to the strand, so that the atmosphere at Batavia contains a mean amount of 84 per cent of vapour, in other words, a cubic metre of air holds in suspension 20·25 grammes of water-vapour, whereas at the sea-level the air would be completely saturated with 26·39 grammes of vapour to the cubic metre. The damp is greatest in the months of January and February, and least in August. Near the sea-shore the air is filled with pernicious vapours developed in great quantities by the heat from the morasses, where many plant and animal remains are always rotting, . . . these exhalations, however, do not appear to rise to a height of more than 900 ft. The Monsoons operate very regularly. The rainy Monsoon prevails continuously from November to March, the dry Monsoon from May to September or October; the shifting of the winds takes place in April and October or November. The most rain falls in December, January, February and March; and, although at this time brighter and rainless days sometimes occur, the sky is usually heavily clouded over, and the rain comes down in copious streams, sometimes for days in succession, causing great floods. . . . In the East Monsoon the dryness is most marked in July and August, when — save for the daily alternating land- and sea-breeze — hardly any wind is perceptible. The moisture in the atmosphere is then deposited as heavy dew, to be taken up again with the warmth of the sun in the morning, forming itself in the upper air into clouds which are driven landwards by the sea-breeze (felt up to 2500 ft. above sea-level) and become heaped up in the Second Zone. They sometimes disburden themselves in thunderstorms in the afternoon, especially in mountainous districts, such as Buitenzorg, where storms accompanied with heavy showers are of almost daily occurrence.

"In the Second or Temperate Zone the mean temperature is 23·6° C. (74·5° F., 18·9° R.) at the lower and 18·7° C. (65·7° F., 15° R.) at the upper boundary, with a very marked difference between the warmth of the day and of the night,

especially on the table-lands. The warmth of the day itself is also subject to more or less variation, according as the moisture out of the First Zone rises sooner or later and in greater or less quantity, which, forming into clouds, intercepts the rays of the sun. Owing to the lesser heat and to the ground also being less damp, less vapour rises here than in the First Zone and consequently the atmosphere in general contains less moisture, the mean quantity of vapour being 15·7 grammes to the cubic metre, while 21·15 grm. at the lower and 16·88 grm. at the upper boundary are necessary for saturation. The degree of moisture also varies much in different localities; it is much greater over the wet rice-fields ('sawahs') and dense woods than over stretches of grass or 'alang-alang', or over plantations of shrubs (tea, coffee). Also the masses of mist driven up from lower territories by the sea-breeze produce great differences. These mists condense here more quickly than in the warmer temperature of the First Zone, and often very heavy storms and showers suddenly result. As to this division it should be remarked that in the west part of Java the atmosphere is much damper than in the eastern portions of the island. The West Monsoon in the highest parts of this Zone is already felt in less force, and consequently the difference between the seasons (the wet and the dry) is here much less marked than in the lower districts, and even when the West Monsoon is in full force in the First Zone, the East Monsoon (the Trade-wind) often blows here for days in succession.

"In the Third or Cool Zone the mean temperature is 18·7° C. (65·7° F., 14·9° R.) at the lower and 13° C. (55·4° F., 10·4° R.) at the upper boundary. The difference of temperature between day and night is here much less marked than in the First and Second Zones; the plateau of Mt. Diëng (6300 ft.) presents an exception to this rule, the difference here being so great that the dew on bright nights sometimes freezes into rime. In this Zone the air, which, in consequence of the diminished warmth cannot carry so great a quantity of water, is entirely saturated with water-vapour (16·88 grm. to the cubic metre at the lower and 11·60 grm. at the upper boundary). The mists rising from the lower regions condense here to such an extent that this Zone might literally be called the Zone of Clouds. They sometimes begin to form as early as nine o'clock in the morning, especially on declivities covered with forest; from 11 or 12 till 2 or 3 o'clock everything is covered with thick fog, which discharges itself — often simultaneously in different places — in storms of thunder and rain, after which alone the sun makes its way again through the clouds. But when the clouds are not broken up in this manner, so thick a fog covers everything for the rest of the day that it is impossible to distinguish an object at twenty-five paces, and it is not till after sun-down that the fog settles on the earth as dew. This, however, is more particularly applicable to the lower parts of this Zone, where the clouds gather most thickly; they seldom ascend to the upper parts, and then in less quantity, in consequence of which the showers there are rarer and less heavy. The influence of the West Monsoon is here almost entirely

imperceptible. The S.E. wind in general blows continuously, though, when the rainy season is going on in the lower regions, it may be replaced for a few days only by the West wind or by complete calm, the latter being the condition which nearly always reigns at night. The rain also is not heavier or more continuous here during the time of the West Monsoon than in the other period, but falls in tolerably equal quantity almost daily throughout the year.

"In the Fourth or Cold Zone (7500 to 10000 ft. and upwards) the mean temperature is 13° C. (55·4° F., 10·4° R.) at the lower boundary, and 8° C. (46·4° F., 6·4°R.) at a height of 10000 ft. above the sea-level. The difference in warmth of day and night is usually not very great; this is to be ascribed to the comparatively small extent of solid ground for the sun to play upon. On the highest mountain-tops, in places where there is no shelter from bushes and other objects, the temperature sometimes descends to the freezing-point, so that water, removed from the ground which contains warmth, receives a coating of ice in the open air and the grass is covered with rime. The moisture of the atmosphere is much less here than in the lower Zones, not exceeding 11·60 grm. at the lower limit and 8·70 grm. at 10000 ft. The air is consequently more rarified, purer, more transparent and fine; sound does not travel well, and breathing is more difficult. The few mists that rise up so high fail to form into clouds; rain is consequently very rare, and then only occurs as a fine drizzle. During great calms, however, it happens that the mists from the lower districts ascend right up into this Zone and then, becoming at once solidified by the ice-cold atmosphere, fall as hail. An East wind prevails uninterruptedly on these heights, though usually falling to a calm at night. Only very rarely, when the West wind is blowing strongly in the lower regions and is driven up the declivities of the mountains, it makes itself felt in the undermost parts of this Zone, bringing mists and fogs with it. At 10000 ft. a West wind is unknown. Obviously there can be no question of a rainy season in this Zone."

Although we have not particulars of the climatic variation at different altitudes in other parts of the Archipelago, it is not to be expected that the high mountains south of the equator will present any great differences from those of Java; those found north of the equator will be affected by other winds.

It is now proposed to examine the different parts of the Archipelago in greater detail.

Celebes. — The greater part of the country, being south of the equator, is under the influence of the Monsoons of the southern hemisphere. Over the Northern Peninsula, which lies just north of the equator, the S.E. Monsoon of April to October seems to be deflected by the S.W. Monsoon of the north of the equator, and from October to April the N.E. Trade-wind of the north similarly deflected by the N.W. Monsoon of the south; in consequence of this fairly due South and North winds respectively figure rather prominently here

on Dr. van der Stok's monthly charts[1]). The fine season over most of the island is during the S.E. Monsoon between April and the beginning of November, the rainy season from November till March, when North-west or North winds are predominant. To this rule there are many exceptions, sometimes due to location, sometimes to shelter from the high mountains.

Touching the Minahassa, Graafland writes (De Minahassa 1867 I, 1): "The changing of the Monsoons here takes place almost imperceptibly. One passes over from the East to the West Monsoon without noticing it otherwise than by the more or less plentiful showers and thunderstorms; and even this is not regular. There are years in which the West Monsoon brings so little rain that poor rice-harvests are the sensible result, while there are again other years when too much rain causes the rotting of the crop. The West or rainy season is calculated to be from the middle of October to the middle of April, but this is not at all certain". Dr. Riedel writes (in lit.) that during the N.W. Monsoon the sea is rough on the north coast of the Peninsula, which faces the wind, while on the south coast the wind is less heavy and blows out to sea. The plantations are harvested everywhere at the same time, and the rice is sown in October—November. There is, however, as Dr. van der Stok's tables show, a marked difference in rainfall between the north and south coasts of the Peninsula; when the N.W. Monsoon is blowing[1]) Manado and Kwandang on the north receive two or three times as much rain as Kema and Gorontalo some 20 miles distant on the south. The interior of the country is mountainous, and, as is clear from Dr. de Hollander's remarks on Java, the N.W. Monsoon is a superficial, somewhat shallow wind, and it is doubtless held back and deprived of its moisture to a great extent by the hills. During the N.W. Monsoon the shipping is carried on at Kema, while during the S.E. Monsoon everything in this way is done at the more important settlement of Manado. Meyer arrived at Manado in November, 1870, having been misinformed by Mr. Wallace that October is the beginning of the fine season for this region. Travellers should go there in April and the following months, though on the south coast of the Minahassa, at Kema for instance, the weather is much better and even fine in the rainy season. September is the driest month of the year.

The western portion of the N. Peninsula seems to be exposed at most times of the year to N. and N.W. and S.W. winds blowing out of the Celebes Sea, and Tontoli at the N.W. angle of the Peninsula cannot be said to have a rainy season, but has a tolerably equal rainfall throughout the year.

The following tables, extracted from the "Regenwaarnemingen in Nederlandsch-Indië", 1895, show the differences in rainfall and rainy days at different places in the N. Peninsula:

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[1]) Sec: van der Stok: Wind and Weather, Currents, Tides and Tidal Streams in the East Indian Archipelago (Batavia, 1897. Broad folio).

[2]) The "Directory for the Indian Archipelago" 1870 p. 22, states that on that part of the island situated N. of the equator the N.E. Monsoon in October replaces the S.W., wrongly adding that it makes the fine season.

Average monthly rainfall and number of rainy days in the North Peninsula.

	Situation	Altitude in metres	Number of years	Rain	January	February	March	April	May	June	July	August	September	October	November	December	Total
Manado	N. Coast	4	17	mm	*478*	*337*	*271*	205	167	179	125	121	82	125	*205*	*418*	2713
				Rainy days	*22*	*18*	*17*	15	15	16	10	12	8	11	*16*	*21*	181
Masarang. . . .	Interior	900	15	mm	*235*	*215*	*224*	*256*	*249*	*228*	135	121	108	182	*230*	*265*	2448
				Rainy days	*19*	*16*	*16*	*19*	*19*	*18*	13	12	8	14	*17*	*17*	188
Kema	S. Coast	—	15	mm	*145*	*139*	*149*	*160*	*124*	*156*	89	88	60	75	*160*	*150*	1495
				Rainy days	*12*	*11*	*11*	*14*	*10*	*13*	9	9	5	7	*13*	*11*	125
Kele-Londej . .	Interior	892	8	mm	*278*	152	*268*	*362*	*287*	*244*	194	194	107	185	*283*	*223*	2777
				Rainy days	*23*	16	*21*	*23*	*22*	*22*	18	19	10	15	*19*	*19*	227
Kwandang . . .	N. Coast	—	15	mm	*234*	*247*	*181*	*167*	*198*	*191*	127	144	81	*170*	*263*	*280*	2283
				Rainy days	*13*	*12*	*10*	*10*	*13*	*11*	8	9	6	*10*	*13*	*14*	129
Gorontalo . . .	S. Coast	—	15	mm	103	86	95	*138*	106	*145*	88	118	49	70	117	*119*	1234
				Rainy days	9	7	8	*10*	10	*11*	8	9	4	6	9	*11*	102
Limbotto	near S. Coast	—	15	mm	*137*	97	132	*179*	*129*	101	88	90	47	79	*141*	*188*	1408
				Rainy days	*10*	8	9	*12*	*11*	9	7	9	4	8	*12*	*13*	112
Tontoli	N. W. Coast	2	15	mm	*263*	*200*	*178*	130	*197*	*310*	*243*	*251*	*185*	*226*	*177*	*246*	2606
				Rainy days	*14*	*12*	*11*	10	*12*	*17*	*13*	*15*	*11*	*16*	*12*	*14*	157

In the South Peninsula the rainy and dry seasons are generally much more strongly contrasted than in N. Celebes. On the west side of this Peninsula the N.W. Monsoon brings great quantities of wet and the S.E. Monsoon for some months very fine weather. On the opposite east coast the converse of this is the rule. This is well shown by the rainfall at Balang Nipa which lies on the east coast of the Peninsula in about the same latitude as Macassar some 60 miles distant on the west coast: May, June and July are among the fine months at Macassar, while great quantities of rain fall at this time at Balang Nipa; but December, January, February and March are fine months at Balang Nipa, during which Macassar receives deluges of rain. Bonthain on the south coast of this Peninsula is sheltered from the N.W. Monsoon by the great Bonthain mass of mountains, and its seasons correspond with those of Balang Nipa, except that much less rain falls. Dr. van der Stok has most obligingly sent us tables showing the direction of the winds at Bonthain in the years 1886, 1887 and 1888. These are chiefly westerly from December to April, veering from S.W. to W.N.W. and generally changing a point or two in the course of each day; from May till the end of November the general direction is east, N.E. to S.S.E., with similar changes during the course of the day.

The following are the tables in the "Regenwaarnemingen in Ned. Ind." for the South Peninsula of Celebes (see next page).

One of the only two injurious winds known in the Dutch East Indies is found on the west coast of Celebes between Maros and Mandar and called the "Barubu". It blows yearly during the months of July, August and the beginning of September from the E. N. E. and extends about a geographical mile seawards. It causes a difficulty in breathing, dries up the lips and the throat, bringing about inflammation of the eyes and often long-lasting fevers (de Hollander, 1882, I, 86). The botanist Teijsmann experienced this wind in the South Peninsula at Pankadjene, Tjamba (6th September) and Bantimurang (26th September). He describes it as a wind which covers everything with fine dust, as very unpleasant, and at sea often very dangerous (N. T. Ned. Ind. 1879, 60, 78). A similar obnoxious wind is the "Anging bolo" of Bima, Sumbawa.

The temperature of Celebes is not high, seldom exceeding 32° C. (26° R., 90° F.). The tables show that August and September are the driest months at nearly all spots where the rainfall has been observed. On the whole, as a glance at our maps III and IV will show, Celebes has the same seasons as the islands lying south of the equator, as indeed should be the case from its geographical position; but at a few spots both in North and South Celebes traces of the minimum of rainfall in February, which is characteristic of N. Borneo and N. Sumatra, may be noticed.

Sangi. — The rainy season seems to set in after October. Dr. Platen, writing from Great Sangi in January, 1887. speaks of having been confined to the house for weeks by ceaseless rain falling in the N. W. Monsoon. (Gefied. Welt, 1887, 263).

Average monthly rainfall and number of rainy days in the South Peninsula.

	Situation	Altitude in metres	Number of years	Rain	January	February	March	April	May	June	July	August	September	October	November	December	Total
Segeri	near W. Coast	3	15	mm	*719*	*463*	*398*	244	216	137	93	28	53	125	*387*	*730*	3593
				Rainy days	*23*	*18*	*16*	15	13	10	7	3	3	7	*15*	*21*	151
Pankadjene . .	near W. Coast	3	17	mm	*876*	*548*	*420*	235	174	165	80	22	35	110	*328*	*760*	3753
				Rainy days	*23*	*21*	*17*	14	11	9	6	3	3	7	*16*	*22*	152
Tjamba	Interior	300	15	mm	*516*	*348*	*261*	207	177	168	124	53	31	82	220	*378*	2565
				Rainy days	*21*	*18*	*17*	16	16	14	10	5	3	7	14	*20*	161
Macassar	W. Coast	2	17	mm	*744*	*544*	*422*	130	101	120	51	13	18	47	189	*663*	3042
				Rainy days	*25*	*21*	*19*	12	9	9	6	3	2	5	12	*23*	146
Alloe	S. Coast	3	14	mm	*457*	*402*	*242*	95	90	97	50	12	12	54	165	*452*	2137
				Rainy days	*17*	*16*	*13*	8	8	8	4	2	1	3	10	*18*	108
Bonthain	S. Coast	1	15	mm	*145*	97	110	125	*170*	*187*	*159*	53	31	41	75	93	1286
				Rainy days	*14*	11	12	12	*14*	*14*	*10*	6	2	4	8	13	120
Saleyer	Saleyer Id., W. Coast	2	15	mm	*239*	120	159	198	164	167	80	10	16	31	148	*240*	1572
				Rainy days	*12*	10	10	13	11	11	6	2	1	3	8	*13*	100
Kadjang	E. Coast	8	15	mm	147	163	168	*281*	*541*	*395*	*312*	76	46	51	98	175	2453
				Rainy days	14	14	13	*16*	*19*	*17*	*14*	5	3	4	6	13	138
Bikeroe	Interior	245	14	mm	*321*	*276*	*306*	*301*	*444*	*407*	*372*	122	58	60	186	*249*	3102
				Rainy days	*17*	*18*	*18*	*16*	*20*	*18*	*16*	9	4	5	11	*18*	170
Balang Nipa . .	E. Coast	3	17	mm	129	118	130	*299*	*461*	*441*	*382*	134	52	105	81	119	2451
				Rainy days	12	11	12	*17*	*20*	*20*	*17*	11	5	6	7	13	151

Sooloo Archipelago and Celebes Sea. — According to the Sailing Directory, easterly winds are experienced here from October till May; from May onwards westerly winds accompanied by "rains, squalls and tempests", especially in July and August (p. 22). From van der Stok's charts the direction of the more prevalent winds is seen to be southerly from June till October, and northerly or north-easterly from November till April.

Philippine Islands. — The windward shores of the islands are in general the wet ones; thus, on the north and east coasts the most abundant rainfall takes place in the half-year from October till March when the N. E. Trade-wind is in force, while the territories to the South and West, which lie exposed to the S. W. Monsoon, have their rainy season during the other half-year. At Manila the winds vary much in the course of each day, owing to land- and sea-breezes. In July, August and September S. W. winds prevail, in November and December N. E. winds, becoming more S. E. in March and April. The town, being on the west coast, has its rainy season during the summer months of the northern hemisphere (cf. Obs. meteor. de Manila de la Comp. de Jésus, 1870—73, 1876). The following observations were obtained by Meyer from Iloilo on the Island of Panay. The S. W. Monsoon commences in June, exceptionally in May, but it does not then blow uninterruptedly. The rain falls in varying quantities, being sometimes heavy, at other times not so; and it may last — though this is the exception — for a month continuously; fourteen days in succession may be taken as the rule, judging from four or five occasions when this was experienced. June—September generally afford disturbed weather; most of August fine. The N. E. Monsoon commences about the middle of October, and there is occasional rain from October to December, in January only very little; from the end of January till March it is dry. In April and May, when the Monsoons are changing, there are occasional thunderstorms.

In Palawan the Monsoons are liable to much interruption, and there appears to be no rainy season in particular (Sail. Direct. 1870 p. 23).

Borneo. — "Owing to the great extent of alluvial ground with which Borneo is nearly everywhere surrounded, to the numerous water-courses irrigating the land in every direction, and to the vapours arising from the dense forest with which most parts of the island are covered the atmosphere is always damp." Land- and sea-breezes are felt far inland. The temperature is more moderate than might be expected; at Pontianak in the west almost on the equator, at sunrise 24·5° C. (19·5° R., 76° F.), at midday not more than 33·3° C. (26·7° R., 92° F.), mean 27·8° C. (22·2° R., 82° F.). As the island is divided by the equator, the northern and southern halves are subjected to the influence of different monsoons.

South of the equator the character of the season is well determined by the particular monsoon in force. The S. E. Monsoon prevails, roughly speaking, in the time of our summer, and the finest months of the year, as is shown by the reports sent in to Dr. van der Stok from six stations in Central and S. E. Borneo,

are July, August and September. June is also a fine month, though somewhat more rain falls than in October, when the returning N. W. Monsoon, the true rainy wind, can hardly have commenced to blow home. The wettest months of the year are from November to March, inclusive, when the N. W. Monsoon is in force. It has been stated that while Borneo south of the equator is having its rainy season under this wind, the parts of the island north of the equator, over which the N. E. Monsoon is blowing, are fine; but this is not altogether true. The great western projection of the island upon which Sarawak (near its north coast), Sinkawang (west coast), Pontianak (south coast) are situated, receives its heaviest amount of wet at the same time as South Borneo. This is also the case at Sintang far inland a little north of the equator. The N. E. Trade-wind does not blow in force right down to the equator, and, when the N. W. Monsoon is going on in the islands south of the equator, an indraught of the deflected N. E. wind must needs take place. In the South China Sea in the islands of Bintang, etc. this deflected wind is felt for half the year as a prevailing North wind (see, p. *32*), and, no doubt, as such, or even as a N. W. wind, it passes over Borneo a little north of the equator, bringing with it great quantities of moisture from the China Sea.

In Northern Borneo the seasons vary much according to locality. Dr. de Hollander speaks of the S. W. (April—October) as the rainy monsoon, and the N. E. (October—April) as the fine one, and so also the Sailing Directory of the Indian Archipelago; but there is much to take exception at in these statements. In an article on the climate of British North Borneo by Mr. Robert H. Scott (Journ. R. Met. Soc. 1889, pp. 206—219), to which Dr. van der Stok has kindly called our attention, it is stated that "the true wet season occurs at Sandakan (on the N. E. coast) in the N. E. Monsoon, and includes the months of November, December and January, and generally part of October or February or both . . . The true dry season immediately follows this true wet season, and includes March and April, and generally the whole of May and part of February . . . This true dry season is followed by a period of moderate rainfall, commencing generally about June. The first month or six weeks of this period almost deserves to be called a second wet season, and the rest of the period up to the commencement of the true wet season might be described as the second dry season". With these variations, the actual figures taken at Sandakan and Kudat show that by far the larger half of the total rainfall is deposited during the N. E. Monsoon, which is not to be wondered at, seeing that these places then present a windward shore to the Monsoon passing over the Sooloo Sea.

At Labuan, the average for 11 years shows that the first four months of the year — the closing ones of the N. E. Monsoon — are the driest.

The following tables are taken from those of Dr. van der Stok (Regenwaarnemingen in Ned. Ind. 1895, 416, 417), and Scott, *l. c.* (the inches of the latter converted to mm).

Average monthly rainfall in Borneo.

Locality	Situation	Nr. of years	January	February	March	April	May	June	July	August	September	October	November	December	Total
South of the equator															
Muareh Teweh	114°43′ E × 0°55′ S	12	*287*	*295*	*312*	*321*	*249*	207	148	161	159	223	*313*	*296*	2971
Buntok	114°30′ E × 1°15′ S	15	*308*	*272*	*345*	*311*	*263*	163	108	123	118	186	*331*	*354*	2882
Amuntai	115°10′ E × 2°15′ S	17	*310*	*287*	*363*	*225*	*210*	154	113	85	79	124	*250*	*325*	2525
Barabei	115°16′ E × 2°17′ S	16	*275*	*305*	*300*	*258*	*241*	205	111	127	88	160	*289*	*350*	2709
Pengaron	115°15′ E × 3°15′ S	17	*334*	*289*	*345*	*217*	*242*	178	111	109	80	149	*242*	*327*	2623
Banjermassing	114°35′ E × 3°19′ S	17	*315*	*303*	*313*	*221*	173	170	112	113	87	144	*221*	*315*	2487
Pontianak.	109°20′ E × 0°1′ S	17	*262*	179	250	230	248	234	171	237	206	*447*	*398*	*369*	3231
North of the equator															
Sinkawang	109°00′ E × 0°55′ N	16	*379*	211	212	233	213	204	166	*301*	195	*432*	*438*	*494*	3478
Sintang	111°32′ E × 0°7′ N	17	*347*	283	*343*	*314*	292	272	229	*327*	261	*403*	*362*	*364*	3797
Kuching, Sarawak . .	110°8′ E × 1°28′ N	5	*690*	*610*	256	255	231	222	121	225	198	252	*345*	*653*	4058
Labuan	115°20′ E × 5°30′ N	11	221	132	184	213	*376*	*353*	*302*	*385*	*275*	*371*	*355*	*352*	3519
Limbnak	117°5′ E × 7°15′ N	1	*285*	79	*610*	188	218	138	183	*562*	117	*457*	*361*	*450*	3648
Kudat.	116°52′ E × 6°54′ N	3	*407*	212	*326*	58	111	176	174	143	126	*242*	*364*	*603*	2942
Sandakan	118°12′ E × 5°49′ N	10	*496*	*235*	194	109	143	*221*	145	188	*258*	*244*	*398*	*514*	3145

As a general conclusion it may be stated that Borneo south of the equator has its fine season during the months of our summer and its wet one in those of our winter. A little north of the equator the conditions are much the same, the differences being that the rainfall is more copious, and that the wet and fine seasons commence a little earlier in the year. August, when the S.W. Monsoon of Asia is in full force, appears to be a very wet month here, as it is also at Labuan, Mempakol, Gaya on the N.W. coast of the island, and at Banguay Island off the north point of Borneo. On the N.W. coast the figures from four stations show a strongly marked minimum rainfall in February; the fine period appears to last for about three months only, January—April. On the North and N.E. coast the true wet season takes place in the N.E. Monsoon and the true dry season about the period of the shifting of the winds, February—May.

Sumatra. — Dr. van der Stok shows that very varying conditions prevail upon the different coasts of this great island.

In the Malacca Straits land- and sea-breezes are general, neutralizing the effect of the Monsoons. The wettest months along this part of the coast of Sumatra are from October to December, the rains being apparently brought up by the N.E. Monsoon out of the China Sea and the Straits. The dry months are February and March, and also June and July, there being here, as in North Borneo, a second rainy and fine period.

At the northern end of Sumatra the S.W. Monsoon is much more marked, being felt from May till October, and bringing the rains with it from the Indian Ocean. February and March, when the E. Monsoon is blowing, are the finest months.

Along the N.W. coast down to the equator it is hard to speak of any rainy — or one might better say of any fine — season. South of the equator down to the Straits of Sunda the wettest months are from September to December, and the driest May to August, with a reduced rainfall in February.

In South and S.E. Sumatra the Monsoons are well marked, the dry season being produced by the S.E. Monsoon from April or May till September, the wet accompanying the northerly and westerly winds which prevail from November to March.

The Bintang, Lingga, Karimon, Timbulan, Anambas, Natuna, and Serasan Islands: groups of small islands in the South China Sea between Malacca and Bangka and Borneo. — These islands receive the rains of both Monsoons and are very wet almost the whole year, the greatest number of fine days occurring in January, February and March. The climate is not considered unhealthy.

Banka, Billiton and the Straits of Karimata and Gaspar. — Here the climatic conditions are very changeable, varying on the land at different altitudes. The greatest amount of wet is brought up by the N.W. Monsoon in November, December and January; there is a minimum of rainfall in February, but the driest months are July, August and September. In Banka the temperature on the coast is given as 21°—24° C. (17°—19° R., 70°—75° F.) during the night

and morning, rising sometimes to 32°—35° C. at midday. In the interior it is less hot, the nights being even cold and damp. In Billiton the damp atmosphere is sometimes very oppressive, although the temperature in the morning and evening is 22°—23.5° C., and rarely more than 29° C. at midday; the nights very cool (de Hollander, t. c, 812, 828; van der Stok, Wind and Weather).

Java. — The chief meteorologic conditions of this island as recorded by de Hollander have been already given (pp. *22—24*). Bad weather is encountered during the N.W. Monsoon (October to April); the fine season accompanies the S. E. Monsoon in the months of our summer. On the south coast much wet is also brought up by the S.E. Monsoon from the Indian Ocean, particularly towards the western parts of this coast, but the true rainy season here as elsewhere is during the N.W. Monsoon. It has been said that bad weather marks the shifting of the Monsoons; there set in "wild storms from the W. and N.W."; "storms of wind and rain beneath a clouded sky alternate with severe gales and heavy winds" (Jansen in Maury's Phys. Geogr. Sea, 14th ed., 380); but the extensive observations of van der Stok lead him to the opposite conclusion — that "the condition of the sea is at its best when the Monsoons turn, i. e. in March, April, and November" (op. cit. p. 57).

The Lesser Sunda Islands (Bali, Lombok, Sumbawa, Flores, Sumba, Timor, Rotti, Timorlaut, and the intermediate smaller islands). — The wet and the dry seasons are here very strongly contrasted, especially in Timor. In this island hardly a drop of rain falls during the five months June—October, while an abundance comes down in December, January and February. The rivers are said to be then overstreaming, but during the S. E. Monsoon many are dried up, and the thermometer then rises to 52° C. in the sun and 35° C. in the shade. A similar drought in summer is found at least on the north coast of the other islands (Bali, Sumbawa). Flores is subject to manifold and sudden changes in the atmosphere, making it very unhealthy. An injurious wind, the "Anging bolo", occurs, as mentioned above (p. *27*), in Sumbawa where the climate is considered unhealthy. The Lesser Sunda Islands as a whole receive far less rain than Java, Celebes or the Moluccas, and only about one-half or one-third the amount of that which falls in Borneo, and ornithologists should not neglect to make studies of possible climatic variation among allied species of birds in these regions, such as have been made on certain birds in North America by Allen (see, below p. *58*). It may be that the climate has had something to do with "Wallace's Line" as far as it goes (see, below pp. *81—89*), for not all animals and plants can exist indifferently in a wet climate like that of Borneo and a dry one like that of the Lesser Sundas. A general similarity between Timor and Australia has been noticed, and it should not be forgotten that the S.E. Monsoon, which is productive of the drought in the Lesser Sundas blows out of the arid deserts of Australia, and it may bring many things directly with it, just as the returning N.W. Monsoon may carry to Australia any thing that is capable of sustaining a voyage through the air.

The Halmahera Group. These islands lying under or near the equator are chiefly under the influence of northerly winds from December to April and southerly ones from June to October, and as they are therefore not sheltered by any great land-masses they receive much rain with both winds. According to Dr. van der Stok there is "a principal maximum in June and July and a secondary maximum in January", but the rainfall seems to be chiefly determined by the position of the place concerned — whether it lies on the windward or lee shore of the island with sheltering hills behind. The climate is stated to be healthy. In Ternate the thermometer seldom rises higher than 30° C. (23.5° R., 85° F.); in Halmahera the mean temperature on the coast is about 30° C. at midday and 23° C. at night.

Buru and Ceram. — In consequence of the high mountain-chains which intersect these islands from west to east, a wall is presented to the alternating N. W. and S. E. Monsoons, so that, when the former is blowing, the northern or windward sides of the islands have their rainy season, while the southern sides, being sheltered by the mountains, are fine. This wind dominates from December to March. From May or June till October, when the S. E. Monsoon is blowing, the previous state of things is reversed; the southern parts now get their rainy and the northern their fine season.

In the "Jahresb. des Ver. f. Erdk. zu Dresden", 1892, 159, 160, Mr. C. Ribbe writes: "The climate of Ceram is one of the heathiest and most agreeable experienced by me in the Indies; from my tables of the temperature I find that the greatest degree of heat at Illu was 32¼° C. in the shade, the lowest 20° C. . . . By shifting quarters according to the time of year, it is possible to live in a perpetual spring, for the great heat, as also the wearisome rainy season can be avoided: you build your hut now on the south and then on the north coast of the island. . . . It would not be safe, however, to conclude that these weather conditions recur from year to year with mechanical regularity; on the other hand frequent exceptions to the rule take place, from which the travelling naturalist may have to suffer severely".

The rainfall has been studied at two places in Ceram — at Wahaai on the north coast and at Amahei nearly opposite on the south coast, spots which are separated by mountains from 6000—10,000 feet high. The following monthly averages for 15 years show the contrast in the seasons at the two spots.

	Jan.	Febr.	Mch.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Wahaai .	*280*	*476*	*293*	*234*	140	106	113	94	93	107	110	*212*	2258
Amahei .	127	101	121	191	*274*	*424*	*537*	*538*	*241*	174	101	109	2938

The figures for February on the one hand and for July and August on the other are particularly instructive. The respective Monsoons are then especially well developed.

Amboina and Saparua. These islands lying under the shelter of the south

coast of Ceram, have their rainy season during the months of our summer, when the S. E. Monsoon is blowing, and a great abundance of rain then falls. The north coast of Amboina receives less rain than the south, but the seasons are not so strongly contrasted as in Ceram.

Banda Islands. "The East Monsoon brings rain and storm with it." April, May and June are the wettest months, and August to November somewhat the driest.

Kei Islands. — The fine season seems to be restricted to three months of the year, viz. August, September and October.

Aru Islands. — A plentiful and generally even amount of rain fell here during the year 1890. Dr. de Hollander writes: "In the West Monsoon, which lasts from the beginning of December to April, the day-temperature is very high, but the nights, when a heavy dew usually falls, are on the contrary cold and raw; during the East Monsoon from the middle of April till the middle of November the heat of the day is less oppressive and the nights less cold. The most rain falls at the turning of the Monsoons; at this time fever occasionally occurs."

New Guinea. — In Dutch New Guinea, as in other islands which are intersected by high mountains, the north coast has its fine season while the rainy season is on the south. Some observations at Doreh and Andei in the Geelvink Bay gave the prevailing winds as east — generally due east — from May to November, which is the dry season, and westerly during the other half-year — the rainy season. Stormy or violent winds were rare and occurred most frequently in the E. Monsoon (Meyer, Ausz. Neu Guinea Reise 1875, p. 20). Van der Stok records the winds at Mansinam, western shore of the Geelvink Bay, as N. E. from May to September, the drier period, and W. from November to April, with a maximum rainfall in February. De Hollander records the temperature as rising to as much as 35.5° C. (28.5° R., 96° F.) during the E. Monsoon.

On the west coast the "Sailing Directory of the East Indian Archipelago" states that the S. E. Monsoon blows from April to November, bringing great quantities of rain chiefly from June to September; the N. W. Monsoon prevails from October to May, when the weather is fine and calm.

Further down the north and north-east coast, some interesting figures, on a parallel with others already given, have been sent in from three settlements in Kaiser Wilhelms-Land: Finschhafen, Constantinhafen and Hatzfeldhafen. Finschhafen[1]) lies at the head of the Finisterre Peninsula, south of the lofty Finisterre Mts. which intersect the peninsula near its north coast; Constantinhafen is on the other side of the range at the head of Astrolabe Bay, and Hatzfeldhafen[1]) higher up the coast. Owing to its position, Finschhafen, together with the adjacent north coast of the Huon Gulf, presents a windward shore to the

[1]) Finschhafen and Hatzfeldhafen are now abandoned.

S. E. Monsoon of June—September, while Constantinhafen lies sheltered from wind and rain by the mountains, which also, with some other nearer hills, protect Hatzfeldhafen. During the N. W. Monsoon the case is reversed, Finschhafen is now sheltered by the Finisterre Mts., and the other two exposed to the wind. Consequently Finschhafen has its fine season with this, the N. W. Monsoon, and its rainy season with the S. E. Monsoon, while at Constantin- and Hatzfeldhafen exactly the opposite takes place. The total rainfall for the year being given as 100, the following shows the percentage of rain when the different Monsoons are in force:

	Finschhafen.	Constantinhafen.	Hatzfeldhafen.
Dec.—April 1886/87	17%	58%	62%
Dec.—April 1887/88	18%	69%	68%
June—Sept. 1886	58%	—	11%
June—Sept. 1887	62%	18%	17%

These results held good for the subsequent reports in 1888 and 1890. (Nachrichten über Kaiser Wilhelms-Land, 1888, 160).

In South-eastern New Guinea Capt. Moresby states that "the N.W. Monsoon blows from November till March, accompanied with occasional westerly gales, and with fine-weather intervals". D'Albertis says that a S.E. wind blows at Yule Island for 8 months and confirms Moresby's remarks in stating that the rainy months are November—February (N. G. 1880, I, 402). The same traveller found that heavy rains fall in the valley of the Fly River from December to April. In the dry and cooler season May—August the max. heat was 29.5° C., and during the hotter months rarely rose to 35° C.

Solomon Islands. — This group is subject to variable winds, violent squalls, and heavy rainfall. The N.E. Monsoon from the end of November to the end of March is considered to be the rainy season. Heavy gales from the west and north-west are not infrequent at this period. The S.E. Trade-wind from April to November seems to blow in fits and starts, interrupted by calms, variable winds, and often heavy squalls and much rain. The temperature varies little: 75° F. at night to 90°—95° F. at noon (Leeper, J. R. Met. Soc. 1885, 309—313).

Northern Australia. — Here the N.W. Monsoon brings the rains, and the S.E. Monsoon, blowing out of the interior, is of course very dry.

This rough sketch of the winds and rainfall in the East Indian Archipelago may, it is hoped, prove to be not without use in the study of the climatic variation of birds, of their local movements, their nidification and moulting. The winds and rains and temperature are also factors which should be taken into consideration in questions concerning the geographical distribution of birds.

The following publications have been consulted in preparing this chapter:

Findlay: A Directory for the navigation of the Indian Archipelago (London, 1870).

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Excerpts from other writings will be found in the text.

We are also indebted to Dr. van der Stok of Batavia for examining an original draught of our maps III and IV and for kindly pointing out and describing an alteration which was neccessary. We had, too, the advantage of Prof. Neumayer's kind advice.

3. MIGRATION IN THE EAST INDIAN ARCHIPELAGO.

Migration in its simplest form. — As Mr. Whitlock points out in his recent critique on Gätke's theories (see: "The Migration of Birds" 1897), the first stage in the history of migration is probably seen in the daily journeys of certain species to their feeding grounds and their return to their roosting places in the evening. In England this may be particularly well observed in the Rooks and their comrades, the Jackdaws; they are very methodical in their daily visits to certain fields, though their movements are by no means governed with the regularity and punctuality of a pendulum. This sort of thing will of course be found in all animals, human or avian or other, which sleep in one spot and dine in another. One of the most striking cases which we have seen from the East Indies is that recorded by Dr. Hagen of the large Hornbill, *Cranorrhinus corrugatus*, in E. Sumatra. These ill-flying birds feed by the sea and return in the evening to their roosting places inland, making use of certain trees about every kilometer of their way as travellers' rests. "The resting places are fixed spots, and, if they are not scared, the birds may be expected with tolerable certainty every evening at the appointed time" (see: text p. 244).

Local movements. — A further development of the principal of migration is seen where species do not spend the hours of a day but remain some weeks or months in one locality, and then depart elsewhere. These movements are probably common in the tropics and depend upon the abundance of certain foods at these periods. Thus Meyer observed that the small Parrots, *Loriculus exilis* and *stigmatus*, *Trichoglossus ornatus* and *meyeri*, visited Manado in great numbers at March or, respectively, April and May, the cause being apparently the flowering or fruit-bearing of certain trees; and the Sarasins found *Munia pallida* abundant at Macassar during the rice-harvest (June, July), but they personally did not see them afterwards as late as September. There is much to be learnt still about movements of this kind in Celebes, but it would be easy to multiply instances in the Indian countries and elsewhere. Dr. E. P. Ramsay (see: "Ornis" 1885) terms the movements of all Australian birds "nomadic", but there are also some species there which are as true migrants as those of the temperate parts of the northern hemisphere (see, below, p. *48*).

Local movements are the more to be expected among the birds of Celebes and other parts of the Archipelago in consequence of the great differences in the season often to be found in spots a few miles apart. The east side of the Southern Peninsula, for instance, has its wet season when the west side has its dry one, and when the west coast is deluged with rain, the east coast has fine weather, though the two districts are only some 30—60 miles apart. In a similar manner the north and south coasts of Ceram are contrasted, and traces of the same condition are seen on the north and south coasts of the North Peninsula of Celebes. The climate of the mountains is also strongly contrasted with that of the plains. We have been at some pains to obtain particulars of the movements of the birds from gentlemen resident in the East Indies, but have not received any data suited to the requirements of the present work, except some notes from Mr. H. Veen of Kele Londej, a place situated at a height of about 3000 ft. in the Minahassa. Mr. Veen has observed in the case of a few species ("Sonsoliat", "Tegi", "Tang-kuitj" = *Hypothymis puella*, "Keresow") that their movements are affected by the abundance or scarcity of food; they generally arrive in groups and start again after 3—4 weeks. He adds: "The blossoming and the ripening of the fruits goes on the whole year, according to the altitude, e. g. the Lansap *(Lansium domesticum)*; near the coast this fruit is ripe towards the end of December and in January; a little higher up in February and March; still higher from April to August. The Durian and the Mango are ripe near the coast as early as December and January, but at Langowan (in the hills) in April—June. The Coffee-tree is in blossom in Kele Londej the whole year round, but at its fullest from November to February, and it begins partially to ripen in May. At Langowan this occurs about a fortnight earlier, and at Tondano a fortnight earlier still. Last year (1893) coffee was gathered every month, though in various quantities. And this though Kele Londej is only about 400 ft. higher than Langowan, and Langowan only about 200 ft. higher than Tondano".

Other phaenological observations from Celebes than these, except stray ones, have not reached us, though we possess such from Middle Luzon, which, however, would not afford a crucial test for Celebes.

Islet nomads. — A curious phase of migration is displayed by several Pigeons of the East Indian Archipelago. The species occurring in the Celebesian area and displaying the characteristic in question are *Caloenas nicobarica*, *Myristicivora bicolor*, *Carpophaga concinna* and *C. pickeringi*. These birds — at least the two first and better known species — are highly gregarious; they repair to breed on certain fixed islets and during the rest of the year seem to wander from one small island to another within their range, only occurring exceptionally on the neighbouring mainlands. In this manner the *Myristicivora* and the *Caloenas* have a range of three or four thousand miles, and that of *Carpophaga concinna* is also large. The Nutmeg Pigeon, *Myristicivora*, is often excessively numerous; we read of the lofty trees of a small island being simply covered with thousands

of these white birds, of their fairly swarming at times on other islets, of great flocks literally hanging in clusters on the trees of the little island of Manado tua. So, too, the Nicobar Pigeon, *Caloenas*, is described as swarming by thousands upon its almost inaccessible breeding islet of Batty Malve in the Nicobars. It is obvious at once that these small islets cannot and do not support such a population of Pigeons for long, consequently the birds are repeatedly on the move, flying over the sea in search of fresh feeding grounds. Instances of their being seen in the act of crossing the sea are given in the text (p. 629, 659). It appears that they visit their breeding islands seasonally, but everything has still to be learnt about the periodicity, if any, of their visits to the other islands of their ranges. The four Pigeons in question have no near affinity with one another; the Nicobar Pigeon is the sole representative of a subfamily; the other three have more or less near affinities with mainland species.

As is well known, certain sea-birds, such as the Gannets, Albatroses, and some Terns, resort to particular rocks or other islets to breed. In their case, as in that of the Pigeons, protection of their brood from animals destructive to their eggs and young may well have been the original motive for the adoption of these habits, yet with the Pigeons it remains strange that they avoid the mainland after their young have been safely reared. (For further remarks hereon, see pp. 616, 629, 659—661).

For the sake of the general reader, who may be apt to suppose that narrow straits of the sea offer no barrier to the geographical distribution of tropical species, it may be mentioned that, so far from this being the case, there is reason to believe that resident species never, or only very exceptionally, cross the sea; were it otherwise the species would not be found with such restricted ranges as is actually the case.

Migration proper in the East Indian Archipelago. — The following is a list of most of the more prominent migratory birds of Celebes. A few species, well known to be migrants, offered difficulties which have led to their being omitted, while a large number of other species have been left out because their migrations are as yet hidden in such obscurity that it would probably be misleading to attempt to trace them categorically. In the case of the species given it has often been impossible, in the absence of positive data, to avoid speculation in the use of the signs for summer and winter haunts, but it will generally be found that too little has been said, rather than too much.

○: signifies "summer visitor". (It would generally be safe to assume that the species breeds in the localities so marked, but in not one-half of them have the nest and eggs yet been discovered.)
×: signifies "winter visitor", or "passes through on migration".
†: signifies "rare", or "a straggler".

Localities	*Tachyspixias soloensis* (Horsf.)	*Accipiter virgatus gularis* (T. & S.)	*Butastur indicus* (Gm.)	*Ninox scutulata japonica* (T. & S.)	*Hierococcyx sparverioides* (Vig.)	*Cuculus canorus canoroides* (S. Müll.)	*Coccystes coromandus* (L.)	*Merops ornatus* Lath.	*Merops philippinus* L.	*Halcyon pileata* (Bodd.)	*Halcyon sancta* Vig. Horsf.	*Cypselus pacificus* (Lath.)	*Pitta cyanoptera* Temm.	*Hirundo rustica* L.	*Muscicapa griseosticta* (Swinh.)	*Lanius tigrinus* Drapiez	*Lanius lucionensis* L.	*Petrophila cyanus solitaria* (P. L. S. Müll.)	*Acrocephalus orientalis* (Temm. Schl.)	*Locustella fasciolata* (G. R. Gray)	*Locustella ochotensis* (Midd.)	*Phylloscopus borealis* (Blas.)	*Motacilla flava* L.	*Motacilla boarula melanope* (Pall.)	*Anthus gustavi* Swinh.	*Anthus cervinus* (Pall.)	*Sturnia violacea* (Bodd.)
Northern Europe	–	–	–	–	–	–	–	–	–	–	–	–	–															
Centr. & S. Europe	–	–	–	–	–	–	–	–	–	–	–	–	–															
South-west Asia	–	–	–	–	–	–	–	–	–	–	–	–	–															
Africa	–	–	–	–	–	–	–	–	–	–	–	–	–															
Madagascar	–	–	–	–	–	–	–	–	–	–	–	–	–															
Siberia, West	–	–	–	–	–	–	–	–	–	–	–	–	–															
Siberia, Central	–	–	–	–	–	–	–	–	–	–	–	○	–															
Siberia, N.E.	–	–	–	–	–	○	–	–	–	–	–	–	–															
Arctic Regions	–	–	–	–	–	–	–	–	–	–	–	–	–															
Bering Islands	–	–	–	–	–	–	–	–	–	–	–	–	–															
Alaska	–	–	–	–	–	–	–	–	–	–	–	–	–															
Kamtschatka	–	–	–	–	–	–	–	–	–	–	–	–	–															
S.E. Sib., Amurland	–	–	–	–	○	–	–	–	–	–	–	–	–															
Mongolia	–	–	–	–	–	–	–	–	–	–	–	–	–															
Manchuria	–	○	–	–	–	–	–	–	–	–	–	–	–															
Corea	–	○	○	–	–	–	–	–	–	–	–	–	○															
Japan	–	○	○	–	○	–	–	–	–	÷	–	–	–															
China, North	○	○	○	○	○	–	○	–	–	○	–	○	–															
China, South	○	×	×	○	–	○	○	–	○	–	–	○	–															
Formosa	–	–	×	–	–	○	–	–	–	–	–	○	–															
Philippines	×	×	×	×	×	×	–	–	○	×	–	×	–															
Borneo	×	×	○	×	×	×	–	–	×	×	–	×	○															
Talaut Islands	×	–	×	×	×	×	–	–	×	–	–	×	–															
Sangi Islands	×	–	×	×	×	×	–	–	×	–	–	×	–															
Celebes, North	×	×	×	×	×	×	–	–	×	–	–	×	–															
Celebes, South	–	×	×	×	×	×	–	–	×	×	–	×	–															
Moluccas	–	–	×	×	×	×	–	×	×	–	–	×	–															
Papuasia	–	–	×	–	×	×	–	×	×	–	×	×	–															
India	–	–	–	–	○	×	○	–	×	×	–	×	–															
Ceylon	–	–	–	–	–	○	–	–	×	×	–	–	–															
Islands, B. of Bengal	×	–	–	–	–	–	×	–	×	×	–	–	–															
Further India	+	–	×	–	–	–	–	–	×	×	–	–	○															
Malay Peninsula	×	×	×	×	–	–	×	–	×	×	–	×	–															
Sumatra	×	×	–	×	–	–	–	–	×	×	–	×	–															
Java	×	×	×	–	×	–	–	–	×	×	–	–	×															
Lesser Sunda Is.	–	×	–	–	–	–	–	×	–	×	–	–	–															
Australia	–	–	–	–	–	×	–	–	–	–	–	×	–															
Polynesia	–	–	–	–	–	–	–	–	–	–	+	–	–															
New Zealand	–	–	–	–	–	–	–	–	–	–	–	–	–															
North America	–	–	–	–	–	–	–	–	–	–	–	–	–															
														Almost cosmopolitan, wintering in the South, breeding in the North													

Localities	
Northern Europe	*Fulica atra* L.
Centr. & S. Europe	*Glareola isabella* Vieill.
South-west Asia	*Lobivanellus cinereus* (Blyth)
Africa	*Squatarola helvetica* (L.)
Madagascar	*Charadrius fulvus* Gm.
Siberia, West	*Aegialitis vereda* (J. Gd.)
Siberia, Central	*Aegialitis geoffroyi* (Wagl.)
Siberia, N.E.	*Aegialitis mongola* (Pall.)
Arctic Regions	*Aegialitis curonica* (Gm.)
Bering Islands	*Strepsilas interpres* (L.)
Alaska	*Totanus glottis* (L.)
Kamtschatka	*Totanus calidris* (L.)
S.E. Sib., Amurland	*Totanus glareola* (L.)
Mongolia	*Heteractitis brevipes* (Vieill.)
Manchuria	*Actitis hypoleucos* (L.)
Corea	*Terekia cinerea* (Güld.)
Japan	*Tringa acuminata* (Horsf.)
China, North	*Tringa damascensis* (Horsf.)
China, South	*Tringa ruficollis* (Pall.)
Formosa	*Phalaropus hyperboreus* (L.)
Philippines	*Limicola platyrhyncha* (Temm.)
Borneo	*Gallinago megala* Swinh.
Talaut Islands	*Limosa novaezealandiae* (G. R. Gray)
Sangi Islands	*Numenius minutus* J. Gd.
Celebes, North	*Numenius variegatus* (Scop.)
Celebes, South	*Numenius cyanopus* Vieill.
Moluccas	*Ardetta eurhythma* Swinh.
Papuasia	
India	
Ceylon	
Islands, B. of Bengal	
Further India	
Malay Peninsula	
Sumatra	
Java	
Lesser Sunda Is.	
Australia	
Polynesia	
New Zealand	
North America	

Almost cosmopolitan; breeds in the far North (occasionally in its southern haunts); migrates south in autumn

During our studies it has become abundantly evident to us that ornithologists are not generally aware that migration goes on in the East Indies to the great extent it does. Naturalists travelling in the Archipelago have rarely had a word to say on this subject, for the reason that they themselves are continually on the move from place to place and are consequently unable to say whether the birds they see are visitors or stationary. Among the residents or travellers of longer standing it would be difficult to mention the names of more than two or three competent observers; of these Mr. Everett has as yet published nothing on migration to our knowledge beyond a few terse notes on individual species, but there are a number of interesting observations extant from the pen of Mr. Whitehead. We quote from this gentleman the following passages relating to the S. E. parts of Palawan: "When the great rush of birds from the far north takes place these plains have a much more lively aspect; hundreds of Wagtails, Pipits, Snipes, and other small Waders are continually flying up on your approach . . . Towards the middle of September, after we had collected all the resident species within our reach, the sea-coast, with its rocky points and estuaries, was by far the most attractive hunting-ground; for about that time the great winter migration from the north reaches the coasts and forests of Palawan. Most Waders passed between 5 and 6. P. M., all in one direction, S.W.; if a small flock settled and was disturbed, never did the birds return, but still hurried on their southward course. By continuing this line of flight they would touch Balabac, and then turn due south down to the coast of Borneo, where some remain for the winter, but most seem to travel further still. When the wind was blowing gales from the S.W., bringing up heavy clouds loaded with rain, then was the liveliest time for moving; on calm, or even moderate days, it was seldom worth while to visit the coast. All these great travellers were as fat as butter, and in no state for a bird-collector" (Ibis 1890 p. 40). Out of a total of 157 species in Palawan 49 are migrants.

Birds at sea. — Nearly all naturalists when at sea in these regions have been visited by birds of migratory species for a temporary rest on board ship. When sailing ships were common this was possibly a more usual occurrence than in these days of steamers. The following passage from F. J. F. Meyen's "Reise um die Erde", 1835 II, 195, is of interest. When crossing the China Sea between Macao, Canton River, and Manila, "besides the ordinary sea-birds a number of various small land-birds were seen, which, as we quickly perceived, were migrating and resting upon our ship. We obtained on this occasion the *Lanius phoenicurus* (Pall.) (= *L. lucionensis*), the *Hirundo domestica* Pall, and the *Motacilla flava*, all of them birds which spend the summer months in Southern Siberia . . . As it appeared all these birds were directing their course towards the Moluccas; the Swallows came along in such numbers that we caught eight of them in the evening. One day the head of a palm-tree drifted by our ship . . . Large birds were resting on this swimming island as it came towards us, and

a host of fishes swam in front of it, while innumerable crabs sat upon it and sunned themselves".

In the special articles on the species records of individuals captured or observed at sea are quoted, such are: *Tachyspizias soloensis* (China Sea, near the Pescadores, May); *Accipiter virgatus* (China Sea, near the Natuna Is., 14th November); *Merops philippinus* (Indian Ocean, November); *Halcyon sancta* (Pacific Ocean, 300 sea-miles S.E. of the Louisiade group); *Hirundo rustica* (several records from the seas between the Moluccas and S. China); *Acrocephalus orientalis* (40 miles N. of the Loochoo Islands); *Motacilla flava* (Indian Ocean and China Sea); *Tringa ruficollis* (China Sea, May 14th); *Hypotaenidia philippensis* (Pacific Ocean far at sea east of Australia); *Myristicivora bicolor* and *Caloenas nicobarica* (Seas of the East Indian Archipelago).

Routes. — The above tables tend to prove that each species has its own route or routes of migration; nevertheless the species allow of a certain amount of co-ordination, as follows.

From Northern Europe and Siberia to the East Indian Archipelago. — So far as species occurring in Celebes are concerned, migration reaches its highest development in the Arctic Chiffchaff, *Phylloscopus borealis* (J. H. Blas.) and the Siberian Pipit, *Anthus gustavi* Swinh. The former is known to breed as far west as Northern Norway (Collett), the latter as far as the Petchora (Seebohm and Harvie-Brown); they also breed in various parts of Siberia. In the winter there are no observations to show that individuals stop short of S.E. Asia and the East Indies; on the other hand they are observed to pass through China on migration, the Pipit holding to the countries washed by or near the Pacific Ocean and not visiting the Indian countries, while the Chiffchaff occurs both in the territories invaded by the Pipit and in Further India and the neighbouring islands as well. So far as can be judged the general direction of the two species in autumn is from west to east across Siberia and then south or south-south-east. They are in singular contradiction to Gätke's picturesque theory of an east to west flight at this season, and *Anthus gustavi* should be contrasted with *Anthus richardi* V., which is supposed to migrate in the opposite direction, and is often referred to for proof by Gätke.

From Northern Europe to Africa, and from Siberia to the East Indies or further. — Many species migrate thus, but, as a rule, appreciable racial differences may be seen in the western and eastern individuals, with intermediate forms from other localities between them. Such are: *Hirundo rustica*, *Cuculus canorus*, *Petrophila cyanus*, *Motacilla flava*, *Motacilla boarula*, *Anthus cervinus*, *Totanus calidris.* Other forms are commonly separated as distinct species in the West and East; such are *Charadrius pluvialis* and *fulvus*, *Acrocephalus turdoides* and *orientalis*, *Tringa minuta* and *ruficollis*, *Limosa lapponica* and *novaezealandiae*, *Numenius phaeopus* and *variegatus.* Others do not differ in the West and East, or at least no prominent racial differences in them have as yet been insisted upon; such

are: *Squatarola helvetica*, *Aegialitis curonica*, *Strepsilas interpres*, *Totanus glottis*, *T. glareola*, *Actitis hypoleucos*, *Terekia cinerea*, *Phalaropus hyperboreus*, etc. It may be that these last commingle more freely in their breeding grounds than the others, and have not yet adopted routes of migration of an equally unvarying character.

From China, or China and S. E. Siberia, to Further India, the Philippines and Sunda Islands as far as North Celebes. — A large number of visitors to Celebes are distributed in summer and winter, respectively, as above. Celebes appears to be reached by individuals which have travelled over the Philippines, and not by birds coming from Borneo and Java. This is shown by the fact that these species occur in the Northern Peninsula, but much more rarely, if at all, in other parts of Celebes. Migrants descending south through the Philippines and across the Celebes Sea are confronted by a lofty barrier 400 miles long formed by this peninsula, and the majority of individuals do not pass over it into South Celebes or into the Moluccas. If the migrants came from Borneo or Java they would reach the west and south coasts first, and their presence on the northern coast could only be accounted for as an aimless progression towards the north-east, of which there is no evidence. The simpler explanation may be assumed with much confidence to be the correct one. The winter visitors, therefore, from China and the North to the Northern Peninsula are: *Tachyspizias soloensis*, *Accipiter virgatus gularis*, *Hierococcyx sparverioides*, *Coccystes coromandus*, *Halcyon pileata*, *Pitta cyanoptera*, *Lanius lucionensis*[1]), *Petrophila cyanus solitaria*[1]), *Locustella ochotensis*, *Lobivanellus cinereus*, *Tringa damascensis*, *Ardetta eurhythma*.

There is no species occurring as a migrant in the Philippines which has been found in South Celebes and not in the North Peninsula, except *Limicola platyrhyncha*, which is as yet known from Celebes by one specimen only from the South-central part of the island.

Species with the above summer and winter distribution, but which pass on further into South Celebes, the Moluccas and Papuasia are: *Butastur indicus*, *Ninox scutulata japonica*, *Cuculus canorus canoroides*, *Acrocephalus orientalis*, *Gallinago megala*, *Numenius minutus*. To these should be added most of the Waders, and the two Wagtails, the Pipit, *Anthus cervinus*, the Arctic Chiffchaff, *Phylloscopus borealis*, etc., which, however, have a higher northern breeding range.

From S. E. Siberia and China to Further India and the Sunda Islands, avoiding the *Philippines.* — This route is pursued by *Lanius tigrinus*, in striking contrast to its compatriot *Lanius lucionensis*, which visits the Philippines in abundance, and the Indian countries and Southern Sunda Islands only sparingly (See pp. 405, 408—410). Most of the individuals of *Pitta cyanoptera* seem to take a route like that of *L. tigrinus*.

West-Pacific migration. — There are several species occurring in Celebes which in winter visit the countries in the more immediate neighbourhood of the Pacific, not crossing to the Malay Peninsula, Sumatra, Java and the islands in

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[1]) Has occurred in the Moluccas.

the Bay of Bengal. *Sturnia violacea*, for instance, is not known from the continent of Asia, but breeds in Japan, from where it seems to fly directly in autumn to the Philippines, Borneo, N. Celebes and the Moluccas. *Muscicapa griseosticta* and *Locustella fasciolata* breed in North China or N. E. Asia and occur in winter in the East Indies which are washed by the Pacific, as far as New Guinea and the Moluccas, respectively. *Heteractitis brevipes* wanders in winter down the West Pacific coasts from unknown breeding grounds in the high North as far south as Australia. A remarkable traveller across the Pacific is seen in *Limosa novaezealandiae;* this bird has been found breeding in Alaska and Arctic Siberia, and it visits New Zealand in great numbers in winter, the majority of individuals apparently flying directly across the Pacific without making use of the East Indies as a resting-place, for the number of examples recorded from there is comparatively very small (see p. 794). In the case of this species, as also in that of the Pacific Cuckoo, *Urodynamis taitiensis* (Sparrm.), it is perhaps erroneous to attempt to avoid the assumption of a "sense of direction". Still ocular remembrance of the sparsely scattered atolls and high islands of the Pacific on which the birds may land or pass over, together with the positions of the sun and stars at certain hours, and the direction of the roll of the waves should not be left out of account as a means by which they may alter and regulate their course over hundreds of miles of trackless ocean (see Möbius: "Ein Beitr. z. Frage üb. d. Orientirung der wandernden Vögel": Ausland 1882 p. 648).

Migration south of the equator. — Professor Newton remarks (D. B. 555): "If the relative proportion of land to water in the southern hemisphere were at all such as it is in the northern we should no doubt find the birds of southern continents beginning to press upon the tropical and equatorial regions of the globe at the season when they were thronged with emigrants from the north . . . but we know almost nothing of the migration of birds in the other hemisphere". In this comment — very true, apparently, in regard to the comparatively small amount of migration south of the equator — Prof. Newton has almost overlooked a great point of difference in northern and southern migration, namely that the birds of the South proceed towards the equator in the time of our summer and leave the tropics again for their breeding quarters about the time that the equatorial countries are invaded by the migrants from the North. The southern territories which call for consideration in this book (the East Indies and Australia) have furnished very few thorough-going migrants; it is certain that the number is very small compared with that of the northern hemisphere, but there is also a regrettable lack here of competent observers and of published observations. One or two passages relating to migration across the Torres Straits seem to show that among the islands here it is possible that a second Heligoland may be found some day. Remarks to this effect are made in Moseley's 'Naturalist on the "Challenger"', 1879, p. 364: "Most of the birds of Cape York are constantly migrating, and the resident official at Somerset told me that the constant change from month to month of

the birds seen about his place was most astonishing. The Torres Straits Islands serve as resting places for the birds crossing from New Guinea; Booby Island is evidently thus used, and the number of its land-birds is thus to be accounted for. This island corresponds thus in this respect with such an island as Heligoland. . . . It is the last place in the world, as viewed from the sea, with clouds of Boobies hovering over it, from which one would expect two new land-birds [a Dove and a Rail described by Gould] to hail. Our officers laughed at the notion of there being quails or anything to shoot upon it. . . . On August 13th, 1841, the officers of the 'Beagle' shot 145 quails, 18 pigeons, 12 rails of two species, and 3 pigeons ["doves" in Stokes' 'Discoveries in Australia' 1846 II, 330]." The contents of the game-book of the "Beagle" when among the islands of the Arafura Sea are large and interesting, though unscientific; an extract is given by Stokes, l. c. The transit of the Australian Bee-eater, *Merops ornatus*, across the Torres Straits has been remarked upon by two observers (see p. 250). This bird takes some weeks to travel from here to its breeding grounds in New South Wales.

Touching migration in Australia Mr. A. J. North (*in lit.* 7. VIII. 1894) has most obligingly furnished us with the following: "There is nothing published in the Proceedings of any society beyond a paper contributed by Dr. E. P. Ramsay to the Ornithological Congress held . . . in Vienna about twelve years ago . . . As there pointed out by Dr. Ramsay we have, comparatively speaking, but very few migratory birds in Australia, but a great number of nomadic species which shift from one point of the country to another, many of them appearing regularly every season in the spring to breed and returning north or west directly the cold weather sets in. From my notes which I have kept for the past twenty years I will give you the date or time of arrival and departure of the species asked for . . .

"*Chaetura caudacuta.* This bird arrives in New South Wales during the hottest months of the year. I have noted them as early as December, but they usually arrive in January and depart again about the middle of April. I have never seen them resting, they pass the whole of the day on the wing.

"*Cypselus pacificus.* Arrives and departs at the same time as the preceding species, with which it is more often than not seen in company. It is not, however, so numerous as *C. caudacuta*.

"*Eurystomus pacificus* and *Scythrops novaehollandiae.* These species arrive in Northern Queensland about the end of August, but their appearance is influenced greatly by the season; sometimes it is at the end of September, and in 1892 it was as late as the 12th of October when *Eurystomus* arrived. They leave again on the approach of cold weather about the end of April. In New South Wales *Eurystomus* arrives usually about the middle of September and departs again early in April. I saw young birds nearly fledged taken from their nesting place in the hollow limb of a tree near Newcastle on the 3rd of October, 1893; this was very early for New South Wales.

"*Halcyon sancta.* The main body of these birds arrive in N. S. W. during August and the early part of September, breed and depart again by the end of March; I have, however, noted straggling pairs during the intervening winter months. In Northern Queensland this bird is a resident species.

"*Circus assimilis* (*C. jardinii* Gould). This bird arrives in N. S. W. during the month of August and is frequently met with in the small clumps of pine (*Callitris*) growing out on the plains in the inland portions of the colony, and in which it is often found breeding during September and October. It takes its departure again about the end of January or middle of February."

The paper of Dr. E. P. Ramsay's referred to by Mr. North will be found in the "Ornis" 1885, pp. 581—584. The author remarks: "One thing with respect to our Australian fauna must be carefully borne in mind, strictly speaking we have no migration among our birds"; and again: "The term 'migratory' as understood by European naturalists, does not apply to any Australian species, the term I propose for these is 'nomadic'". Dr. Ramsay considers that Australian birds wander from place to place in quest of fresh feeding grounds and suitable breeding quarters; when they have reared their young, they retire to another part, sometimes only 10 or 20 miles away. "The *Hirundinidae*, our species of *Gallinago*, *Rhynchaea*, *Merops*, *Artamus* and some *Rallidae*, make the closest approach to a migration here as they sometimes wander from the north to the south of Australia". We know nothing about the endemic species of Australia, but, as regards others which occur in Celebes, Dr. Ramsay's statements are certainly more or less erroneous and misleading. Two to four natives of Australia occur only as migrants in Celebes, in the same manner as a number of natives of the northern hemisphere reach the island and proceed as far as Australia in the south. Evidences of remarkable migrations across the Torres Straits have been given above. Of birds breeding in Australia *Merops ornatus* (though a few probably stay out of the general migration on occasions) is known to be a migrant to Celebes and the Moluccas; *Glareola isabella* and *Halcyon sancta* are almost equally certainly such; the Australian form of *Eurystomus orientalis* has been recorded from Celebes and probably correctly, though we confess to an inability to distinguish the supposed races of this bird. *Circus assimilis* and *Scythrops novaehollandiae* seem to be residents in Celebes, though it would be a matter for no surprise if their numbers ultimately proved to be affected by migration to and from Australia. Some of the greatest migrants of the North travel to Australia, among them being the following visitors to Celebes: *Cypselus pacificus*, *Squatarola helvetica*, *Charadrius fulvus*, *Aegialitis vereda*, *A. geoffroyi*, *A. mongola*, *Strepsilas interpres*, *Totanus glottis* and *glareola*, *Heteractitis brevipes*, *Actitis hypoleucos*, *Terekia cinerea*, *Tringa acuminata*, *Tringa ruficollis*, *Limosa novaezealandiae*, *Numenius minutus*, *N. variegatus* and *cyanopus*. There are also several other species about which particulars as to migration would be very welcome, such as *Turnix maculosa*; the Herons, *Herodias eulophotes*, *H. alba*, *H. garzetta*, *H. intermedia*, *Notophoyx novaehollandiae*, *N. picata*

and *Nycticorax caledonicus*; and the Rails, *Hypotaenidia philippensis*, *Amaurornis cinerea* and *moluccana*. Dr. Ramsay's term "nomadic" for wandering Australian birds denotes an initiatory form of migration not of a regular half-yearly character, but, as is shown by the above species, a development of the migratory habits is sometimes found as high as in many species of the northern hemisphere.

The return-migration. — Birds do not appear always to return in spring by the route pursued in autumn, often, apparently, being rare or absent in one season in districts through which they pass in abundance in the other season.

Birds which stay behind in their winter quarters. — It seems to be a very common occurrence for a few individuals to stay throughout the year in the winter resorts of the species. Among Celebesian species which have been found in the island after their fellows have departed to their breeding localities in the North, or, respectively, the South, may be mentioned: *Merops ornatus*, *Motacilla flava*, *Charadrius fulvus*, *Aegialitis geoffroyi*, *A. mongola*, *A. curonica*, *Totanus glottis*, *T. glareola*, *Heteractitis brevipes*, *Tringa acuminata*, *T. ruficollis*, *Numenius variegatus*. To these *Motacilla boarula* and *Anthus gustavi* should probably be added; the first has been sent to us from Manado tua as late as May, the Pipit as late as May 26th. Other instances of migrants killed in the Moluccas and elsewhere at dates when the main body of their species is absent will be found in the text. During his travels in Polynesia Dr. Finsch found many Waders of several species on the Marshall and Gilbert atolls of the Central Pacific in the summer months; and similar observations will be found in "Stray Feathers" and elsewhere.

It is unprofitable to speculate on the cause of this violation of the general rule, as the possible explanations are many and the individual judgment is prone to select that which conforms best to its own prejudices. Several reasons may indeed work together in inducing these birds to stay behind. The following is likely to escape general observation, viz. the time of shedding the remiges varies in individuals[1]) and a bird with its powers of flight thus diminished at the spring migration might well hesitate at attempting the journey. Or an accident — a broken wing or leg — may delay an individual, and as observers know, one or more sympathetic companions will be likely to remain by the injured one with a devotion equal to that of man himself. In other cases, as, for instance, the individuals on the atolls in the middle of the Pacific, it may more plausibly be supposed that the birds had lost their way. At other times it looks as if the birds remain behind simply from choice. But, though in Natural History it is almost always impossible to assert that a certain this, and this only, is the true explanation, it is happily sometimes possible to show that some other is an untrue explanation. Thus, it has been asked in Baird,

1) See pp. 739, 744, 747, 761, 762, 765, 768, 772, 798.

Brewer and Ridgway's "Water Birds of North America" 1884 I, 123, whether those birds which spend the summer in the winter haunts of their species are not old, effete and barren individuals. This suggestion is negatived by the fact that among such visitors to Celebes five species have been known to breed in some part, or parts, of their winter range, viz. *Charadrius fulvus*, *Aegialitis geoffroyi*, *A. mongola*, *Strepsilas interpres* and *Limosa novaezealandiae*.

Causes of migration. — It may be tritely said that birds migrate in autumn to feed, in spring to breed! At the approach of winter most birds must of necessity proceed towards the tropics, or starve, owing to the disappearance of their food through death or hibernation, or through concealment under snow or ice. In spring the temperate and arctic regions produce an abundance of food and, it may be presumed, offer safer and easier conditions for the propagation of the species than is found in the tropics; the birds then repair to their native haunts. Naturalists, who seek for physiological conditions to account for the actions of the subject, may find a stimulus for the spring migration in the annual development of the reproductive systems, while the approaching autumnal moult of the remiges may sometimes serve as a warning to species that it is time to accomplish their flight towards the equator, for many of them leave long before the cold sets in. Waders killed in their winter quarters in the Celebesian area in the late autumn or winter months are generally found to be moulting some of their remiges. Possibly, however, the chief motive for the spring migration is to be found in the love of home so strongly developed in birds, for without this it is conceivable that they would attempt to establish themselves in the tropics for breeding purposes. Instances of the marvellous regularity with which individuals return to the old breeding haunt after a journey of hundreds, or more often thousands, of miles have excited the admiration of all field-observers. That the young birds also sometimes follow their parents to their birth-place is shown by a case given on p. 48 (text). But it seems to be the case — which is not so generally known — that birds display a very similar adhesiveness in the choice of their winter quarters. An instance of enormous numbers of Wagtails and Swallows returning two years in succession to roost in a coffee garden in Ceylon, as observed by Mr. S. Bligh, will be found on p. 537; and Davison states that a large number of migratory *Collocaliae*, which had taken to roosting upon a certain spot about a yard square against the roof of a shed in the Andamans, disappeared when the building was pulled down, only to come again and occupy the same spot on a new shed, which had been put up on the identical site (p. 332). There are no rookeries near Dresden, but every year about the beginning of November great numbers of Rooks and Jackdaws pass over the neighbourhood for many days in succession[1]), and some spend the winter there.

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[1]) The flocks fly high, so that it is sometimes difficult to detect them with the naked eye. The mode of progress is very slow in a S. or S.W. direction, perhaps at the rate of 12 miles an hour, and conducted with much cawing and calling and circling in the air, as if none wish to have the responsibility of leading the way.

Two or three individuals often make their appearance in the daytime in the Bismarckplatz in the town each year, though they are not always driven there by cold and hunger, and they are most likely the same birds each season. There is an autumnal migration route of Wild Geese (*Anser segetum*) at Grossenhain near Dresden, the birds making their appearance during their transit to the South every year on the fish-ponds at this place, but only quite exceptionally on the fish-ponds at Moritzburg some 10 miles to the S.E. Mr. Schwarze of the Dresden Museum informs us that Kingfishers did not occur in summer at his native village in Saxony, but were to be found every winter, when the fish-pond was frozen over, at the inlet or trap where water was let in, and where there were plenty of small fish. The Grey Crow, *Corvus cornix* L., visits the Eastern counties of England in great numbers every autumn; these birds do not proceed far inland, being unknown in the Western counties; and such is almost equally the case in the Southern Midlands, for instance, in Northern Buckinghamshire. Yet these parts of England appear to be quite as capable of sustaining them as the Eastern counties. Mr. W. Eagle Clarke's "Digest of the Reports on Migration" should also be read in this connection.

If the birds remember their final and intermediate halting-places so well, it appears that they must find their way in migrating by means of such familiar land-marks and stations. It is well known that "homing" Pigeons are lost if turned out in a strange country, and these birds are trained for long flights by breaking the journey into a number of stages and thus gradually lengthening the familiar landscape. In the same way it can well be understood how such a bird as *Phylloscopus borealis*, which migrates from Norway across Siberia to the East Indies, may originally have been a native of East Siberia, but extended its breeding range for a mile or two at intervals, the advanced individuals flying back over the known track to their comrades in autumn; while the young generation gathered experience from the older travellers, and thus the ancient traditional route was increased in extent.

Nevertheless it should be pointed out that Professor Newton, who was one of the first to examine the "homing" faculty of Pigeons in the hope that it might afford a clue to explaining how migrating birds find their way, has since been led to abandon it, holding that ocular memory as the guiding medium is disproved by three facts; first, that migrating birds fly over the open sea, sometimes thus traversing as much as a thousand miles before they can reach land; secondly, that much migration is done in darkness at night, sometimes at high elevations; thirdly, that "among migrants the young and old always journey apart and most generally by different routes". These reasons may well be considered beyond all objection by many ornithologists, but by others not so. A bird may take its direction across the vast open expanses of the Pacific, as has been already remarked, by means of the familiar lay of the land at starting, the rise and setting of sun and stars, and, as Prof. Möbius has suggested, by the direction of the roll of the waves; also by ascending to a height of 10000

feet (which seems to be within what has actually been observed — Dict. B. p. 563) a hill of 2000 feet could be seen at a distance of 190 English miles, and similar heights in the land the bird is leaving would disappear at this distance behind.[1]) This of course could only take place under suitable atmospheric conditions, but, should such conditions be thought impossible, it may be mentioned that Meyer when in Celebes was able from the top of Mt. Klabat (over 6000 feet) to see the islands of Maju and Tifore in the Molucca Straits, a distance of about 90 English miles, and the guide, the Hukum kadua of Ayermadidi, who had ascended the mountain four times, stated that Ternate could sometimes be seen, a distance of about 170 miles. The hills of Tifore are only 300—400 feet high, but the Peak of Ternate reaches 5300 feet. The effects of refraction may still further increase the length of view. It would be of interest to know whether the birds ever attempt their great journeys across the Pacific at night. As to nocturnal migration it should be remembered that nights are seldom of a "pitch" dark character, when we are not aware that birds[2]) are heard migrating, and it is not unreasonable to suppose that they keep in view the outlines of the country over which they wander. As to the young birds migrating alone, it may be that a small percentage of adults among them may have been overlooked by those who have made these statements; like many others we do not entirely trust the evidence. But if it be accepted, such cases seem to point to "inherited experience", the young bird recognising the right way by innate knowledge, in the same manner as a newly hatched chick knows that grains of rice are good to eat. If birds have a "sense of direction", why do they take such indirect routes to their destinations?

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[1]) Prof. Pattenhausen of the Royal Technical School in Dresden has most obligingly given us the following formula for making this computation: Granted the atmosphere as perfectly transparent and, further, that the rays of light travel directly onward from the surface of the sea, the equation is:

$$s = 3{\cdot}8\,(\sqrt{h} + \sqrt{h'})$$

when h = the height of the point of view in metres,
h' = the height of the object seen in metres,
and s = the radius of view in kilometres.

[2]) Diurnal birds almost certainly have a long and clear range of vision, although it may not be fair to cite the Vulture, Kite, and Kestrel in proof. At night they seem to experience much the same difficulty as ourselves. Those who have practised netting along hedgerows with a beater on one side and a double-handed clap-net on the other are well aware that it is next to no use attempting to catch birds except on dark nights, and even then the great majority see the net against the sky and avoid it. But the manner in which a scared party flutter in some neighbouring hedge to which they have flown, is in part due to the difficulty they have in finding a perch in the dark, and shows that they do not see distinctly.

4. VARIATION.

The phases of Variation, or Modification of Structure and Plumage displayed among the birds of Celebes may be conveniently considered under the following headings:

1. Individual Variation; the differences peculiar to the individual.
2. Geographical Variation; as shown by local races, subspecies, or species.
3. Seasonal Changes; such as peculiar summer and winter plumages in birds.
4. Sexual Differences; the secondary sexual characters.
5. Changes depending upon Age; the development and decadence of the individual.

1. Individual Variation.

The assumption that no two individuals are ever exactly alike seems to be completely justified by facts. No one, probably, is so fully aware of this, as the zoologist, who is called upon to make the closest possible comparison of large series of individuals of the same race. In the course of writing the present book, for instance, which is chiefly based upon a study of the external coverings, and bills, legs and feet of Celebesian birds, with occasional reference to their skeletons — some thousands of specimens have been examined, yet to the best of our knowledge no two of them were exactly alike; moreover in the text several thousand measurements of parts will be found, yet we believe that hardly any two cases occur in which four terms (wing, tail, tarsus, bill) are the same. There are some very close observers of Nature to whom a knowledge of this infinite diversity of form is perceptible; who, as children, are conscious of the peculiarities of individual Sparrows or the differences in blades of grass; others, and amongst them men of learning, have never had their eyes opened to the fact, and assert that exactly the opposite is the case. Thus the idea of a uniformity of the individuals of a species is encouraged by the latter, with its consequence, that species were evolved *per saltum*. This position is partly the result of a system of nomenclature which no longer meets the needs of our time. There are of course species — groups of individuals possessing some character (or characters) never so found in any other group, — but each individual has its own peculiarities, and an ideal system of nomenclature can only

be attained when each specimen is compared with the type — the first-described individual — of its species, and a formula representing the difference appended to the binomial name. Such a method is however impossible at present for practical reasons; there is no means of measuring the differences in question. Another reason why individual variation finds so little mention from those who have most experience of it is that for a long time a strong effort has been made to enforce the recognition of subspecies; the effect of this has been to give undue prominence to geographical variation and to divert attention from individual and other phases of variation, which form exceedingly difficult factors in the study of local races, and are for that very reason disregarded by careless or ignorant writers.

Range of individual variation. — Compared with some other animal forms, for instance, certain Beetles, individual variation in birds (other than domesticated races) keeps within somewhat narrow limits. The maximum as regards variation of plumage is seen in the male Ruff *(Machetes pugnax)*. The extinct Solitaire *(Pezophaps)* of Rodriguez was also extremely variable; its osteological remains show that "the variability of colour he (Leguat) had noticed in the females — some fair, some brown — was paralleled by the marvellous variability displayed by almost every bone of the skeleton" (Newton, D. B., 890). Other familiar examples of high individual variability among birds are furnished by the Honey Buzzard *(Pernis apivorus)*, the Common Partridge *(Perdix cinerea)*, and the Common Crossbill *(Loxia curvirostra)*. The minimum of individual variation is perhaps found among certain highly local species of Pigeons, such as those of the genera *Ptilopus* and *Osmotreron*; also many Sunbirds, Kingfishers, Parrots, etc., seem to be very stable in this respect. The differences separating many species of Pigeons are so small that it creates a feeling of surprise to find that large series of specimens do not present every sort of intermediate form and other modification. Under domestication, on the other hand, the Blue Rock Dove has displayed a most remarkable variability. A high degree of individual variability is sometimes found among species of birds in which the sexes are dissimilar (e. g. *Machetes*, *Macropygia*, *Gallus)*, but the sexes are dissimilar also in *Ptilopus*, *Osmotreron*, the Sunbirds, and other stable forms, so that this factor evidently has no direct influence in the matter.

Some species vary much in the measurements of various parts of the body, but little in coloration (e. g. *Streptocitta*, *Amaurornis moluccana*); others vary much both in size of parts and in coloration (e. g. *Halcyon chloris*, *Xanthocnus flavicollis*). Highly specialized features are generally very variable: for instance, the long tails of *Streptocitta*, *Phoenicophaes* and *Fregata*, the long hind claws of *Centrococcyx* and *Hydralector*, the long bills of *Limosa* and *Numenius*, the long tarsus of *Himantopus*; but age also plays an important role in this connection.

Psychological differences of individuals. — Persons who have closely observed or have kept wild species in confinement have often noticed differences of

temperament in individuals; some are bold and fierce, others more gentle; some more clever, others more stupid; some trustful, others shy; and so on. A marked "individuality" in birds may sometimes be noticed in their choice of their feeding grounds and nesting spots.

Monstrosities. — Cases of exceptional individual variation, infraction of the rule of bilateral symmetry[1]) etc., have not fallen under our observation among Celebesian birds. There is a tame Duck with webless toes in the Sarasin Collection from North Celebes.

Albinism, Melanism, etc. — Among genera occurring in Celebes albinism, partial or complete, seems to be most frequent in the Coucals, *Centropus* and *Centrococcyx*. The Hornbill, *Cranorrhinus* sometimes displays white spots on the tail, but this may be a partial reversion to a form with a white band across the rectrices, as seen in some allied Hornbills. Cases of albinism are so common in the Heron, *Demiegretta sacra*, that this species may be rightly termed dimorphic. A further advance of albinism is seen in species which are now always white, such as certain Herons and Swans, for it seems certain that these birds were at one time coloured species.

According to the observations of Mr. K. G. Henke (see, besides, Z. ges. Orn. 1886 III, 268), albinism, when partial, does not conform to the rule of bilateral symmetry.

Partial melanism occurs in a highly variable degree in the large Talaut Oriole, *Oriolus melanisticus*, which appears to be developing into a species with a black upper surface. The Bittern, *Xanthocnus melaenus* (Salvad.) may ultimately prove to represent a case of frequent melanism in *X. flavicollis*. Permanently black species among Celebesian birds are *Ictinaetus malayensis* (when adult), *Surniculus musschenbroeki*, *Eudynamis* (males), *Rhabdotorrhinus exaratus* and *Cranorrhinus cassidix* (females), *Dicrurus*, *Corvus*, *Limnocorax*.

Examples of individual xanthochroism in *Trichoglossus ornatus* have been mentioned by Brüggemann, Meyer, and Guillemard among Celebesian birds (see text, p. 121). The species of *Cacatua* and *Myristicivora* are probably permanently xanthochroistic forms. The sulphur tint of the plumage of the former in life[2]) is due to the absence of the pigment fuscin, the colour parrot-green being caused by the yellow pigment psittaco-fulvin lying on the fuscin (see, Meyer, Sitzb. Ak. Wiss. Berlin 1882, 518); and the similar tint in the Nutmeg Pigeons is probably caused in the same manner, very possibly by the same pigment.

Dichromatism. — The phenomenon of dimorphism seems to be classifiable under Individual Variation, although there are cases where it appears to mark the commencement of the evolution of a new species. The best illustration of

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[1]) See below p. *68*.

[2]) It fades through exposure to the light in course of time in skins and stuffed examples, leaving the plumage white.

dichromatism among Celebesian birds is afforded by the Heron, *Demiegretta sacra*; this bird is ordinarily slate-coloured, but a pure white form is very frequent, and in some parts of its range, as in the Andamans, white individuals number some 20 per cent of the species. The two forms are known to breed together, and pure white young ones, as well as the usual dark ones, are known from the nest; piebald specimens are also not uncommon. It may well be, as has been suggested by Dr. Stejneger, that *Demiegretta sacra* will in the end become a pure white species, like the allied Herons of the genus *Herodias*, one of *Ardea*, and *Bubulcus* (when not breeding). In other parts of the world three more Herons are known among which white individuals are of very frequent occurrence (see text, p. 822).

The genus *Spilornis* is supposed by some ornithologists to be dichromatic when young, but further proof of this is wanting (see p. 3). *Ardetta eurhythma* perhaps makes an approach to dichromatism, since the male is sometimes known to breed in its immature dress (the ordinary female dress), and a female is occasionally found in the male plumage. Other cases of dichromatism have not been found among Celebesian birds, and the phenomenon is indeed always rare in ornithology.

Modifications of the individual due to foreign violence, such as injuries to feathers and parts of the body, disease, effects of shelter and exposure, of food etc. cannot be discussed here, as leading too far. Only a remark or two. The heredity of oft-repeated external action on feathers is discussed below, pp. *73—79*. Remarkable effects may sometimes be produced by food, such as the conversion of Canaries or white Fowls into red ones by feeding them with Cayenne pepper. Isabelline-coloured Pigeons fed with crumbs coloured with Methyleosine were turned into birds of a permanent red tint, and green Australian Parrakeets (*Mellopsittacus*) supplied with millet coloured with Methylviolet were converted into blue birds, the yellow forehead becoming white or dirty white (Sauermann, Mitth. Ornith. Vereins Wien 1890, pp. 92—94). Parrots (*Sittace*) in Brasil are made to change colour into yellow by plucking out feathers and inoculating the wounds with a frog's or toad's blood or with the milky secretion from its skin; when the new feathers grow the colour is changed. The common Amazonian green Parrot (*Chrysotis*), if fed with the fat of large Siluroid fishes, becomes beautifully variegated with red and yellow feathers. In Halmahera *Lorius garrulus* is said to be influenced in a similar manner. (After v. Martius and Wallace, communicated by Meyer: Sitzb. Ak. Wiss. Berlin 1882, 521.)

Thus we imagine that a bird flying to a neighbouring island and finding there another sort of food, may, if settled there, acquire some new character in coloration; e. g. *Loriculus stigmatus* flying over to Banggai becomes *sclateri ruber*, to Togian Island *quadricolor*, etc. etc., these forms only differing slightly. Such alterations may occur per saltum or at least quickly, not requiring generations. A fruit from Batavia planted at Manado does not always remain the same, as

is well known there; wood-ruff transplanted from the woods loses its aroma. Examples could be added by scores. Though we cannot explain these alterations mechanically, facts remain; so it is with insignificant variations in the colours of birds in new localities, if isolated. How easily colour may be influenced is shown by the following case of one of the *Musophagidae*, *Corythaix albocristatus*, first made known by Dr. Chenu (Encyclopédie D'Hist. Nat. Oiseaux 2me partie 1855 p. 55): "Une particularité remarquable, dont nous devons la communication à Jules et Édouard Verreaux, si bons observateurs, c'est que les douze ou quatorze pennes alaires, qui sont d'un si beau pourpre violâtre, perdent cette couleur chez les individus vivants, lorsqu'elles ont été mouillées par la pluie: si, dans cet état, on vient à les toucher ou à les frotter avec les doigts, ceux-ci se trouvent aussitôt rougis par la couleur pourprée qui a déteint sur eux; et, en séchant, ces mêmes plumes reprennent leur éclat primitif. Sur la dépouille de l'Oiseaux, aucun effect semblable ne se produit. Ce fait nous paraît unique dans la classe des Oiseaux."[1]) Though this be exceptional, no doubt chemical or mechanical alterations of colour occur elsewhere, be they dependent on food, light or other external influences, touching which we know next to nothing at present. Alteration of colour in individuals, gone astray to isolated localities, leads us to geographical variation, which should next be treated of.

2. Geographical Variation.

Although it is conceivable, and indeed likely, that a new species may sometimes owe its origin to dimorphism, a condition which may be ultimately due to the successful multiplication of a single case of exceptional individual variation, it is nevertheless far more certain that the great majority of the peculiar forms of Celebes and the neighbouring islands are what are termed geographical species or local races, which have developed their distinctive characters while geographically isolated from one another. In the Celebesian area there are about 150 species of this description now known, not to speak of a large number of partially formed races. The latter are in many respects the most interesting, as they show species in the first stages of their differentiation, and their study holds out the best hope of solving the problem of the origin of species — or at least of the majority of species. The differences seen are often very small, but of a very palpable description, as, for instance, the broader black border to the secondaries of *Eos histrio* in Sangi, the narrower border in Talaut; the darker grey of the head of *Phoenicophaes calorhynchus* in North Celebes, the lighter grey in the South, and so on. These differences may be due to an inherent tendency in the individuals in question to evolve

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[1]) Compare Schlegel: J. f. O. 1858, 381; A. Bogdanow: C. R. Ac. Sc. Paris 1857 XLV, 311 and 1862 LIV, 660; Brehm Tierl. 3. ed. 1891 V, 138; Krukenberg: "Die Farbstoffe der Federn" in his Vergl.-Physiol. Stud. 5. Abt. 1881, 75.

in a certain direction (as a complete ceasing from all variation, even under unaltered conditions, is inconceivable in the course of the propagation of organic forms), or they may be caused by local influences. For some cases the former assumption appears unavoidable; for other cases there is satisfactory evidence of the effect of local influences, though the exact nature of these latter is almost always uncertain; as a rule, probably, both causes operate together, but it very rarely happens that an opinion either way is permissible at present. In illustration of independent development in the same direction it may be mentioned that the genus *Loriculus* has produced two species with very similar red crowns in Ceylon and in the Southern Philippines; and a corresponding distribution of markings is seen in the plumage in the two forms of Celebes (*L. stigmatus*) and Sooloo (*L. bonapartei*), which are not closely related to one another (see p. 163 et seq.). Local influences are sufficiently indicated when a number of species are found to vary in the same place in a corresponding manner; for instance, two phases of modification have been detected by Mr. Allen among North American birds and are recapitulated by Professor Newton (Dict. B. 1896, p. 1005) as follows: there is "a general increase of intensity toward the south and development of dark markings at the expense of the light intervening spaces, so that of brightly-coloured species southern individuals are the most brightly coloured, and some tints, which to the northward cannot be called brilliant, become vivid in a lower latitude. In respect of longitude Variation occurs with like regularity, the differences appearing to hold a direct relationship to the humidity of the climate. Thus on the dry plains of the middle and western parts of the continent birds have a pallid complexion, while on the Pacific slope they resume nearly the tints of the eastern form, though further to the northward, in the rainy belt that extends along the coast of British Columbia, they acquire a depth of colour far in excess of that which they display on the Atlantic border."[1]) In such cases the direct influence of climate upon the colours appears to be proved.

The following instances of correlated geographical variation are noticeable among the birds of the Celebesian Province.

Increase of size in the Sangi and Talaut Islands. — The local species or races of Sangi and Talaut having their nearest affinities with species on the mainland of Celebes are:

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[1]) This quotation, which we have reprinted, is only from a résumé of Mr. Allen's original memoir: "On the Mammals and Winter Birds of East Florida" (Bull. Mus. Comp. Zool. Cambridge, 1870—1, II, pp. 161—450, plates IV—VIII) which should be consulted here, chiefly pp. 239 sq., where he says: "Causes of Climatic Varation. — ... The southward increase in depth of color and in iridescence in birds specifically identical coincides also with the general increase in brilliancy of color in birds, taken as a whole, in the lower latitudes (as well as in insects and animals generally), the maximum being reached in the tropies. — The longitudinal Variation, or the westward increase in color, seems to be also coincident with the increased humidity to the westward, the darker representatives of any species occurring where the annual rainfall is greatest and the palest where it is least ..."

Sangi	Talaut
1. *Tanygnathus muelleri sangirensis* M.Wg.	1. *T. muelleri—sangirensis*
2. *Ceycopsis sangirensis* M.&Wg.	
3. *Cittura sangirensis* Sharpe	
4. *Hypothymis rowleyi*[1]) (Meyer)	
	2. *Dicaeum talautense* M.&Wg.
5. *Acmonorhynchus sangirensis* (Salv.)	
	3. *Hermotimia talautensis* M.&Wg.
6. *Anthreptes malaccensis chlorigaster* (Sh.)	
7. *Zosterops nehrkorni* W. Blas.	
8. *Calornis panayensis sangirensis* (Salv.)	4. *Calornis panayensis sangirensis* (Salv.)
9. *Osmotreron sangirensis* (Brügg.)	
10. *Ptilopus xanthorrhous* (Salv.)	5. *Ptilopus xanthorrhous* (Salv.)
11. *Macropygia albicapilla sangirensis* (S.)	
12. *Megapodius sangirensis* Schl.	6. *Megapodius sangirensis* Schl.

To the Talaut list the following species having their nearest affinities in the Philippines and elsewhere should be added: 7. *Tanygnathus talautensis* M.&Wg.; 8. *Zosterops babelo* M.&Wg.; 9. *Oriolus melanisticus* M.&Wg.; 10. *Carpophaga intermedia* M.&Wg.; and to the Sangi list should be added *Oriolus formosus* Cab., allied to Philippine and Sula forms.

There are about 17 species in Sangi with near affinities to forms on the mainland of Celebes, but which have developed more or less appreciable local differences. Of these 17, no fewer than 12 named in the above list have increased in size in Sangi, while two others, *Prioniturus platurus* and *Dicaeum sangirense*, are probably also a trifle larger than their relatives on the mainland. *Dicrurus leucops*, *Hermotimia sangirensis* and *Pitta caeruleitorques* have not increased in size, but they are at the same time not smaller than their Celebesian allies. In no case have Celebesian species decreased in size in Sangi.[2])

The imperfectly explored Talaut Islands are at present known to possess 8 peculiar species allied to forms belonging to Celebes or the Philippines, not counting 2 with Moluccan affinities; and to these eight should be added 4 Celebesian forms which Talaut possesses in common with Sangi. Ten of these twelve species display a marked increase of size in Talaut, and the other two show no reduction.

The converse supposition that the large forms of Sangi and Talaut represent the original size and that the races of Celebes and the Philippines are those which have undergone alteration, viz. reduction in size, is not plausible. The islands seem most obviously to have been colonised chiefly from the mainlands

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[1]) Nearest affinities uncertain.

[2]) From the island of Siao belonging to the Sangi group a single very small specimen of an Owl like *Scops manadensis* has been described by Schlegel as *Scops siaoensis*. Its distinction is not admitted in this work (see p. 104).

of Celebes and the Philippines, and not Celebes and the Philippines from them; their volcanic or coral character (see de Hollander, Land- en Volkenkunde Ned. Oost. Ind. 1884, II, 234) and the absence of heavy, ill-flying birds and of peculiar generic types speak for the recent upheaval and colonisation of these islands[1]). It might happen that a species or two on the mainlands subsequently became smaller, but there is no reason to assume that the twenty species which remained in Celebes and the Philippines all became small hereafter, while those which had peopled the islands all maintained the original sizes of the species. On the other hand there is reason to anticipate that the individuals of these twenty species which had emigrated to the new islands would undergo alteration of some kind or other, for the conditions of existence are not precisely the same there. It appears, therefore, quite safe to assume that Celebesian and Philippine birds develop as a rule into larger races in Sangi and Talaut[2]).

As is usual in such cases it is not difficult to find more than one explanation why these things should be so, but not easy to decide which explanation is the true one. The most plausible suggestion is that the dangers are fewer and the struggle for partners perhaps more severe in Sangi and Talaut than on the mainland. Hawks and Falcons which prey upon birds seem to be very rare in these islands; so far not one bird-eater, strictly speaking, has been killed in them, for *Tachyspizias soloensis*, the most dangerous to small birds, is not only a migrant but feeds to a great extent on insects. Moreover there are no monkeys in Sangi and Talaut, and other enemies, which could be dangerous to breeding birds, their nestlings and eggs, are rarer than in Celebes and the Philippines. The chief competition therefore that goes on would appear to be among the birds themselves, and the largest and strongest will be more likely to secure nesting quarters and partners than the smaller and weaker[3]).

Decrease in size in Sula. — Two Birds-of-prey and two Pigeons display a slight reduction in dimensions in the Sula Islands, viz. *Spilornis rufipectus*, *Accipiter sulaensis*, *Turacoena manadensis* and *Macropygia albicapilla*. Sula seems to resemble Celebes in its Birds-of-prey.

Differences in size in the North and South Peninsulas of Celebes. — As a rule the birds agree in their dimensions in these districts, but where there is a difference it seems to be in the direction of an increase in size in South Celebes. *Pachycephala meridionalis* and *Stoparola meridionalis* are much larger than the

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1) Prof. Hickson noticed evidences of recent slight elevation in Talaut (Nat. in N. Celebes 1859, 151, 157).

2) The case affords a good illustration of our postulate, that colonists become more changed than stayers-at-home (see, p. 162).

3) It may be added that many ornithologists are of opinion that the males of most species of birds are more numerous than the females, and Dr. Platen certainly collected many more males than females in the Sangi Islands (see W. Blasius, Ornis 1888, pp. 527—646); but it may well be that the superior plumage of the males leads to their being shot and skinned more frequently, and it is preferable not to introduce this doubtful element into the argument.

representative species, *P. septentrionalis* and *S. septentrionalis*, of the North; also *Carpophaga paulina* shows a slight increase in size in the South, and a very small increase is noticeable there in *Streptocitta albicollis* and in *Phoenicophaes calorhynchus*.

Similar geographical variations of coloration. — The Lories of the genus *Trichoglossus* range from Australia as far as Celebes and consist of two groups, *Trichoglossus* proper of Australia, the Lesser Sundas, Papuasia, the Moluccas and Celebes, and *Psitteuteles* of Australia, the Lesser Sunda Islands and Celebes. Count Salvadori (1891) recognises 16 species, all of which have a yellow (in two cases red) band across the base of the remiges, except in the Celebesian area, where there are three species, *T. ornatus* and *P. meyeri* in Celebes, and *P. flavoviridis* in Sula, which have no yellow band. We have, however, found small evidences of a yellow band in two or three immature specimens out of 17 examples of *T. ornatus* and in three young specimens and one female in a smaller series of *P. meyeri* — a significant indication that these species are derived from birds which possessed the band, such as are found inhabiting the countries to the east and south of Celebes to-day. Why the birds have lost the band in the Celebesian area it appears useless to speculate.

Pitta forsteni of Celebes wants the usual white wing-band.

The Serpent-harrier, *Spilornis rufipectus*, and the Sparrow-hawk, *Accipiter rhodogaster*, of Celebes, are represented in the Sula Islands by two closely allied, but slightly smaller forms (*S. rufipectus sulaensis* and *A. sulaensis*). Both of these have undergone a similar modification of the wing, viz. the bars on the under surface of the remiges have become narrower in Sula, or have increased in width in Celebes, as the case may be.

The Cuckoos of the genus *Eudynamis*, which range from the Himalayas to Australia, have pale bills, and the Kingfishers of the genus *Pelargopsis*, ranging from India to the Sula Islands, have red bills, except in Celebes, where both the Cuckoo and the Kingfisher have the bill black, while the bill of the latter is varied with black and red in the neighbouring Banggai Archipelago.

Out of the ten known geographical species of the Talaut Islands three display melanotic influences or, at least, a darkening of their tints; these are *Oriolus melanisticus*, *Dicaeum talautense*, and *Pitta inspeculata*. The Lory, *Eos histrio talautensis*, has, however, slightly less black on the wings than the *typical Eos histrio* of Sangi.

The above cases are included under the heading Geographical Variation, because their peculiarities of coloration seem most probably to be connected with some unknown local influences; there are in the Celebesian area, however, other cases of similar variation, the cause of which seems to be in no way connected with the locality. Such are *Pernis celebensis* and *Spizaetus lanceolatus* which are similar, adult to adult, and young to young, as are in the same way also *Spilospizias trinotatus* and *Accipiter rhodogaster;* while *Muscicapula westermanni*,

Lalage leucopygialis and *Graucalus bicolor* correspond in coloration to a considerable extent, male with male, and female with female. These cases call for consideration later on.

3. Seasonal Changes.

The modifications which birds undergo at certain periods of the year seem to depend sometimes upon climatic, sometimes upon sexual conditions. The breeding season however is regulated by climatic conditions, the young being brought forth at a period when food is abundant; consequently climate should be regarded as promoting all periodic variation. Climate alters the appearance of the surface of the earth — causes it to be clothed with a luxuriant vegetation or covered with snow and ice, now bringing forth an abundance, and then removing the supply of food — and organisms are modified to suit these conditions. In the tropics, as, for instance, in Celebes, where a contrasted summer and winter does not exist, but only a fine and a rainy season, strongly marked periodic changes in the plumage of the birds are rarely seen. More than 160 peculiar species are now known from the Celebesian area, and seasonal changes are not known to occur in a single one of them, though sexual differences are common enough. A few tropical or subtropical Herons (*Ardeola*, *Herodias*, *Bubulcus*), a *Cisticola*, and perhaps one or two others which are resident in Celebes differ when in nuptial and simple plumage, but, in order to see seasonal variation in full evidence, it is necessary to look to the northern temperate and arctic regions. Here, as is well known, most remarkable contrasts of summer and winter plumage are abundantly represented; as, for instance, the varied dress of the Ptarmigan (*Lagopus mutus*) in summer, its snow-white plumage in winter; the black under surface of the Golden Plover (*Charadrius*) in summer, the whitish of these parts in winter. Many northern forms visit Celebes in winter, often in an attire very different from that in which they breed in the North; amongst them may be mentioned the Eastern Golden Plover (*C. fulvus*), and the Grey Plover (*Squatarola*) which undergo a similar seasonal change; the Stints and Godwits which are suffused with rufous in summer; the Glossy Ibis (*Plegadis*) which has the under parts chestnut in summer, earthy brown in winter; the Phalaropes; certain Terns (*Hydrochelidon*), etc. These changes are not of a sexual nature, as the sexes differ little or not at all in coloration, and both are subjected to the same seasonal changes; but in many — probably in most — cases where there are any secondary sexual differences these characters are intensified in the breeding season and new markings are sometimes added in the male sex (e. g. the ruff of *Machetes*, the black facial markings in some species of *Aegialitis*, the long tail-feathers of *Vidua*). It may, however, also happen that the sexes are less similar in the winter season than when breeding; this seems to be the case to a slight extent with *Anthus cervinus*.

The moult. — In the temperate and cold regions of the northern hemisphere it is generally admitted that a complete moult takes place in birds in autumn after the breeding season; many species moult again in spring, and some a third time in summer. The principal time for moulting in Celebes, Sangi, and Talaut seems to be from July to December, when the birds probably undergo a complete post-nuptial moult. It is questionable whether signs of a spring moult can be found; on the other hand some species may be found moulting during most months of the year. For instance, specimens in the Dresden Museum of *Heteractitis brevipes* are moulting in January, April, July, August, November; of *Actitis hypoleucos* in January, March, July, November.

Some of the Waders, autumn visitors from the North to Celebes (*Aegialitis geoffroyi*, *Heteractitis*), seem to moult first on the under parts, then the remiges, and finally on the upper surface. No regular order in moulting is pursued in the Black Sunbirds (*Hermotimia*), among which the transition from young to adult male dress can be particularly well observed. The characteristic metallic subgular stripe of the Celebesian species makes its appearance first, but the rest of the plumage is developed without any such regular sequence, and there is a specimen of *Hermotimia talautensis* in the Dresden Museum (C 15377) in almost complete adult dress except on the forehead and crown, while a second of the same species (C 13847) has the plumage of the adult on the forehead and most of the crown, but the young dress on most of the other parts. This proves that the transition from the young to the adult dress does not take place in perfect phylogenetic order; that is, the adult characters are not necessarily developed in the young male bird in exactly the same sequence as that in which they were acquired in the evolution of the race (see, also, immature male, pp. 469, 471).

Besides their feathers some birds are known to shed certain corneous appendages or coverings on their bills; for instance, the white Pelican of America has a horny knob on the culmen during the breeding season, but which falls off when that period is over; and the Puffin (*Fratercula*) moults the horny sheath of its bill and the outgrowths over the eyes (Newton, D. B., pp. 599, 600). It is possible that a similar moult of the ribbed plates at the base of the bill of the Celebesian Hornbill, *Cranorrhinus cassidix*, takes place. It is believed by the natives to add one rib-plate each year; and, though this notion is certainly wrong, it is possible that a shedding of the plates has been observed.

Change of coloration without a moult. — In a recent number of the "Auk" (1897, April) Dr. Chadbourne has furnished what seems to be the first really conclusive evidence that a change of colour may take place in the perfect feather, this being caused by a redistribution of the pigments already present in the shaft and barbs. The observations were made on the male Bobolink, *Dolichonyx oryzivorus* (L.), but there can be now no doubt that the principle is

general among birds. The difficulties of making observations are great, and no certain evidence has been adduced from Celebesian birds, but Prof. W. Blasius holds that *Centrococcyx bengalensis* when passing into adult dress is subjected to certain colour changes without moulting (see, also, p. 215 of our text).

The changes in colour of certain corneous or epidermal parts, such as the bills and legs of certain Herons (*Herodias*, *Bubulcus*) in the breeding and winter seasons, may perhaps be placed in the same category as changes of colour in the feathers without a moult (see p. 838).

4. Sexual differences.

In relation to sex it is convenient to gather birds into three groups:

1. Male more highly developed than the female. Examples: *Paradiseidae*, *Trochilidae*, *Cinnyridae*, many *Phasaniidae*, many *Anatidae*, etc., etc.

2. Sexes alike. Examples: *Pittidae*, *Artamidae*, many *Ploceidae*, many *Alcedinidae* and *Cuculidae*, most *Ardeidae* and *Laridae*, etc., etc.

3. Female more highly developed than the male. Examples: *Turnicidae*, *Phalaropus*, *Limosa*, *Hydralector*, *Centrococcyx*, *Rhynchaea*, *Eudromias*, *Casuarius*, *Dromaeus*, the *Crypturi* and others.

To these may be added doubtfully:

?4. Sexes developed on independent lines of evolution. *Eudynamis*, *Monachalcyon*, *Cittura*. The sexes either differ in coloration from the nest or after the first plumage: nevertheless there is some reason to think that the adult female represents an earlier stage in the evolution of the race, and that the species concerned should, therefore, be placed in the first group. Thus the female of the Black-billed Koel, *Eudynamis melanorhyncha*, resembles another Cuckoo, *Centrococcyx bengalensis*, when the latter is in first plumage; *Monachalcyon monachus*, especially the female, bears resemblance to *Halcyon hombroni* of the Philippines; the female of *Cittura cyanota* is more like both sexes of *C. sangirensis* than is the male.

It is not to be understood that these groups are always sharply characterized and easily distinguishable; on the other hand, gradual transitions from one group to another are found: from such contrasts of the sexes as are seen in *Paradisea*, *Gallus* and *Cinnyris* in which the male far surpasses the female in adornment, to *Tanygnathus* and *Zosterops* in which the female is hardly inferior to the male, to *Pitta* and *Myristicivora* in which there is nothing to the human eye to choose between the two sexes, to *Limosa* and *Phalaropus* in which the female becomes rather the finer bird, and so on to *Turnix* in which she is much superior to her partner. It also happens at times that the male is the more advanced in one respect and his mate in another; thus, among the Birds-of-prey the male generally has the more highly developed plumage, but the female is of larger size.

The psychological differences of the sexes. — The rule found among mammals — that the male is more active and wars and works for the sake of the female, while the female is more passive and gentle and devotes herself more to the care of the young — holds good also for large numbers of birds, but in many others the sexes seem to be much alike in temperament and to share duties, while in some species the rule is more or less completely subverted, the male undertaking the "female duties", and the female assuming the usual role of the male. The fact is important, as it shows that there are no mental peculiarities originally bound up with the primary fact of sex. It appears, moreover, that these psychological conditions often (but not always) accompany the three conditions of development of plumage and structure mentioned above; namely, when the male is more highly developed than the female, he is noisy, combative and extravagant of display in his courtship, while the female builds the nest or most of it, incubates the eggs, and takes the chief or sole care of the young; when the sexes are alike, the males are less quarrelsome in the breeding season, less demonstrative in their courtship, and share the work of incubating the eggs and rearing the young; when the female is the more highly developed, she is noisy, pugnacious with other females and courts the male, leaving him to do most or all of the work of hatching the eggs and caring for the young. Thus the highly coloured males of the *Trochilidae*, many *Anatidae* and *Gallinae* seem not to concern themselves for the brood to which the plain-looking female devotes herself most faithfully, whereas the large and handsome female *Turnix* roams about and calls and fights other females, leaving the smaller and plainer male to attend chiefly to the incubation of the eggs and the welfare of the chicks, though indeed she does most of the nest-building and assists a little in hatching the eggs (Krohn, Gefied. Welt, 1894, 190). The female of one of the Emus which is larger than the male and wears a slight top-knot has been observed in captivity not only to leave the entire work of incubation to the male, but apparently to use her utmost endeavours to destroy her young when hatched (Darwin, Descent of Man 1871, II, p. 205).

Among species the sexes of which are much alike in appearance and which share the duties of incubation may be mentioned the Tits, *Paridae*; many Warblers, *Sylviidae*; some Larks, *Alaudidae*; some Buntings, *Emberizidae*; certain Finches, *Fringillidae*; Woodpeckers, *Picidae*, and others; while in other cases the male feeds the brooding female and sometimes relieves her in sitting for a short time (cf. e. g. Naumann's Vögel Deutschlands, 1824, IV, 93 and in many other places). But it is by no means always the case that the finer one sex in birds is in comparison with the other, so much the more he (or she) will abandon the nest, eggs and young to the humbler consort, and that the more similar they are in appearance, the more evenly will they share duties. As instances to the contrary may be mentioned the male Ostrich, which, though the finer bird, broods on the eggs of his wives at night; the females of the Birds-of-prey, which are usually superior to the males in point of size (though not in coloration),

fulfil the usual maternal duties properly; the males of the Swallow, Goldfinch and Hoopoe which, though very like their mates, are said to take no share in the incubation of the eggs; while the male Reed Bunting and Blackcap, which are more highly developed than their mates, nevertheless help a little in hatching the eggs. There appears, therefore, to be no hard and fast law of correlation in the evolution of higher organic development and of mental functions of the "masculine" type; in other words, the structural differences and the psychological differences of the sexes seem to have been developed independently.

Theories in explanation of the development of secondary sexual characters. — Several have been advanced:

1. Darwin (Descent of Man, 1871, pp. 38—238, Birds) accounts for the superiority of the male by reason of the choice by the female of the male which pleases her best (sexual selection), and

2. partly by the survival of the fittest in combat.

3. Wallace (Darwinism, 1889, 289, et seq.) believes that the secondary sexual differences have risen to a higher development in one sex owing to a prepotency of vitality or growth-power, and some evidence is adduced tending to make it plausible that the accessory plumes of the males are developed over centres of high muscular or nervous activity.

4. Wallace (t. c. p. 277, Darwin, t. c. p. 166) adds the complementary theory that the need for protective coloration in the brooding female has prevented her by natural selection from acquiring many of the bright colours and showy ornaments of the male.

5. Stolzmann (P. Z. S. 1885, 421, et seq.) bases a theory on the assumption that among birds the males are more numerous than the females. Any development of colour or markings which is disadvantageous to the males, by rendering them more conspicuous and more easily destructible to foes (whether predaceous animals or males of their own species), will be advantageous for the species, because the superfluous males are parasites devouring food which would be useful to the breeding birds, persecutors of the brooding females, destroyers of the eggs, etc. It is argued that natural selection will favour the preservation of those females which produce male offspring handicapped with such peculiarities of structure, plumage, temperament, etc., as are likely to bring about the destruction of these males.

6. Beddard (Animal Coloration, 1892, p. 282 *et antea*) finds that "the secondary sexual characters of animals are dependent upon the germ glands themselves; and that the sexual diversity of animals is also associated with differences of disposition and habit".

Touching Darwin's theories it is obvious that natural selection in the "law of battle" affords a simple explanation of the development of certain offensive and defensive organs, greater size, strength, activity and courage.

Mr. Wallace's theory of the development of protective coloration in the

female is also easily to be understood on the ground of the elimination of the disadvantageously coloured birds of this sex, yet the explanation does not seem to apply to the majority of cases, in many of which the female is like the male, and in others she is only a little less bright or wants some special marking and appears then to represent a lower stage in the history of the race, as the immature male is often like her. Many males assist in incubation. The female of the Cuckoo, *Eudynamis*, which lays its eggs in Crows' nests does not appear to be protectively coloured, but the male, being black, might be thought to be so.

Darwin's theory of sexual selection has been much contested of late years. The author cites cases of certain female birds in captivity mating by preference with certain males and avoiding others; though allowance must perhaps be made for this in nature, there is now a strong opinion in favour of the view of a passive role being generally played by the female, the male expelling his rivals and making the female yield to him.

There is much to be said for Mr. Wallace's view of an excess of vitality or growth-force in the male as the cause of the development of superfluous decorative plumes, etc., though a localization of such growths in the skin "over centres of high nervous or muscular activity" is not tenable. For instance, the second primary of the male *Macrodipteryx*, an African Nightjar, is developed into an enormous racket-feather capable of erection; three long racket-feathers sprout from each side of the head of the male of the Paradise-bird, *Parotia*, one very long one in *Pteridophora*, etc., etc. As the principal muscular and nervous centres are not different in birds, such a great diversity in the location of the accessory growths could not arise from this cause. Why does the male *Paradisea* have its ornamentation chiefly on the side of the breast, and another Bird of Paradise, *Lophorhina*, on the occipital region and jugulum?

Mr. Wallace's theory appears to include "the normal development of colour due to the complex chemical and structural changes ever going on in the organism" (Darwinism, p. 288), for the sex which possesses the most growth-force will be the first to undergo these necessary modifications. It is probable that a great number of sexual differences owe their origin to this developmental law. (See *Loriculus*, *antea* p. 57).

Mr. Stolzmann portrays the two sexes as naturally inimical to one another's well-being. The males above a certain number are useless parasites, they diminish the food-supply and persecute the females; ill-fed females produce an excess of male offspring, and the female for her own preservation produces males which are disastrously equipped for the struggle for existence. We are unable to grasp the argument, if indeed it is a valid one, for it appears to us that the handicapped males will be the first to perish, and the males which will perpetuate the species will be the sons of females which produce the best-equipped offspring. Their qualities being inherited, these males will somewhat counteract the tendency on the part of certain females to produce inferior males, and the latter females will be less likely to survive than their sisters. As their inferior

male offspring will not be allowed to perpetuate itself it would appear that such females will have to breed with the finer males and their harmful effect on that sex will be done away with in course of generations, because the male qualities are transmitted in part to the female offspring as well as to the male.

Mr. Beddard's opinion that sexual dimorphism is mainly dependent upon the reproductive organs is based upon such rare cases as that of a hermaphrodite Chaffinch (p. 262) in which one side of the bird was found to be like the male in coloration, the other side like the female, with the generative systems correspondingly divided[1]). As bearing upon the same matter may be cited the circumstance that old females which have lost their fertilily sometimes assume the male dress.[2]) Such facts appear to be very instructive, perhaps proving that the sexual glands themselves through nervous influences determine the coloration of the integument, intricate questions, which we are not prepared to discuss here. But when Mr. Beddard suggests that the differences in disposition and habit of very many males and females are dependent upon the sexual germ glands themselves he appears to be contradicted by reasons given *antea*, p. *65*.

Exceptional cases. An examination of exceptions often throws more light upon a matter than is afforded by the contemplation of the rule. The female of the Coucal, *Centrococcyx bengalensis*, is much larger and stronger than the male, though of similar coloration; it utters remarkable cries and is not known to take any share in incubating the eggs; the male is small, silent, and it broods on the eggs. Moreover the male possesses only one testicle, the left one being entirely wanting. The conditions have been fully described by their discoverer, Bernstein, in the Natuurk. Tijdschr. van Ned. Ind. 1860, pp. 27—49, pl. I; and mentioned J. f. O. 1859, 185; 1860, 269. (See also, *subtus*, pp. 219, 220). Apparently both Darwin, Wallace, and Beddard might claim this case as supporting their different theories. Darwin, though he seems to have overlooked the fact, anticipated the possibility of such a condition: "If we might assume that the males . . . have lost some of that ardour which is usual to their sex, so that they no longer search eagerly for the females . . . then it is not improbable that the females would have been led to court the males, instead of being courted by them" (Descent, p. 207). For Wallace's view it might be claimed that the structural deficiency of the male points to a lower status of vitality, sufficient to account for its smaller size and quiet habits. In accordance

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[1]) The Chaffinch quoted by Prof. Beddard was described by Prof. Weber (Zool. Anzeiger 1890, 508). Compare Prof. Cabanis' descriptions of such differently coloured halves in *Pyrrhula vulgaris* and *Colaptes mexicanus* (J. f. O. 1874, 344); of v. Rosenberg's of a Chaffinch with two anterior halves of the body, the one in coloration a male, the other a female (M. O. Ver. Wien 1884 VIII, 87 & plate) and of Kleinschmidt's of a bilateral-asymmetrically coloured specimen of the Common Kingfisher (Abh. u. Ber. Zool. Mus. Dresden 1898/9 Nr. 2 p. 73, plate III). Also the remarks of Prof. Brandt on *Arrhenoidia lateralis* (Z. wiss. Zool. 1889 XLVIII, 107) should be consulted. Lorenz asserted that he had seen a similar case in *Tetrao tetrix* (see: Tichomirow: "On Hermaphroditism in Birds" — written in Russian — 1887 p. 21 note), but we doubt this.

[2]) "Hahnenfedrigkeit". Comp. Meyer: Auer-, Rackel- und Birkwild 1887 p. 33, and Abh. Ber. Mus. Dresden 1894/5 Nr. 3, as well as Brandt's paper quoted in note 1.

with Beddard's theory, the reduction in size and the quiet disposition of the male bird should be due to the partial atrophy of the male organs. Beddard's theory here seems to contain the most probable explanation, and it would be well to make observations on other *Centropodinae*. It still remains to be demonstrated how such an aberration has arisen, which is perhaps comparable to the development of only the left ovary[1]) in the female of all birds.

In the case of *Turnix nigricollis*, in which the male does most of the work of incubating the eggs, the large and strikingly coloured female is supposed from observations by Mr. Krohn (Gefied. Welt, 1894, 190) to be given to polyandry. Darwin cites Jerdon's remark that the females are "much more commonly met with than the males". It is difficult to reconcile this statement with the former supposition, but these cases are mentioned here as showing that the contrast in size, habits, etc., may sometimes, as in *Centrococcyx*, be accompanied, and perhaps determined, by a deficiency of reproductive energy or capacity, or sometimes, as perhaps in *Turnix*, by an excess of reproductive power.

In addition to the 6 theories of the origin of secondary sexual characters mentioned above at least two more can be indicated.

7. Secondary sexual characters as "recognition markings". Mr. Wallace (Darwinism, 1889, p. 217 et seq., and in other works) seems to have been the first to define conspicuous markings and patches of colour as useful means by which individuals of a species may at once recognise others of their own kind. He applies his theory to species and further on (p. 284) to the sexes.

8. Development of accessory sexual characters owing to external violence or excessive physiological employment of the parts in question. Use promotes the development of a part in the individual, disuse its atrophy. In the next section of this chapter reason is also given for the opinion that mutilations of feathers — and hence of other parts — if repeated for generations are inherited.

In the present case out of 8 theories of the origin of secondary sexual characters it may well be that 6 have been actually operative in Nature, working alone or more likely in different combinations and degrees. These causes are:

1. The differences of the reproductive organs (Theory 6).
2. Higher development owing to a prepotency of growth-force (Theory 3).
3. Survival of the fittest in combat (Theory 2).
4. The stimulation of parts to a higher development by use and external violence or irritation (Theory 8).
5. Development of recognition-characters by natural selection and preferential mating of males and females which can distinguish one another (Theory 7).
6.[2]) Protective coloration for the sex which broods on the eggs (Theory 4).

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[1]) A rudimentary right ovary is usually present (Gadow, Vög. in Bronn's Kl. u. Ord. 1891, p. 842).

[2]) As to Darwin's theory of sexual selection authors are disagreed.

5. Changes depending upon Age.

The modifications of plumage and structure displayed during the life-time of the individual, the phenomena of its development and decadence, may fitly be placed at the end of this chapter, as one form or other of the four preceding phases of variation — sexual, seasonal, geographical, and (if perpetually recurrent) individual variation — is often repeated during the growth of the young towards maturity.

Classification of the developmental phases. — Charles Darwin (Descent of Man, p. 187) gives six "classes of cases or rules under which the differences and resemblances, between the plumage of the young and the old, of both sexes or of one sex alone, may be grouped". Keeler (Evol. Col. Feath. 1893, p. 213) adds two classes more. All eight of them have representatives among Celebesian birds, and they allow of re-grouping according to the phase of variation which exerts a predominant influence in each case.

Sexual influences predominate in four classes:

1. Male more highly developed than female: young like female (*Loriculus*, *Cinnyris*, etc.).
2. Female more highly developed than male: young like male (*Turnix*).
3. Male like female: young like the parents (Many *Psittaci*, *Columbae*, etc.).
4. Male unlike[1]) female: young male like adult male, young female like adult female (*Monachalcyon*, *Cittura*)[2]).

The influence of seasonal variation appears to be prepotent for the following:

5. Male like female: young like the adults in winter plumage (*Bubulcus*), or like them in summer plumage (*Alca*), or intermediate between summer and winter plumage (*Charadrius*).

The influence of some previous condition in the history of the race (hereditary geographical or individual modification) is sometimes satisfactorily, more often doubtfully, displayed under the following conditions:

6. Male like female: young different from both (*Munia*, *Larus*, *Ardea*, etc.).
7. Male unlike female: young different from both (*Siphia*, *Chalcophaps*, *Eudynamis*,[3]) etc.).
8. Male unlike female: young ones different, and differing sexually from one another (*Graucalus bicolor*).

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[1]) Probably a higher development: see *antea*, p. 64.

[2]) The condition — male unlike female: young male like female, young female like male — is not known.

[3]) In *Eudynamis* the coloration of the young is supposed to be protective (see Whitehead, Ibis 1888, p. 410; and Expl. Kina Balu 1893, p. 145).

9. Male unlike female: young female like adult female, young male peculiar (*Microstictus* partly; *Dryobates* and *Xenopicus*: Keeler, p. 224).

It seems to be a very true remark of Darwin's that these several classes graduate into one another.

Ancestral characters. — At the present time much interest turns on the difficult question of the manifestation of the past history of the race occasionally to be read in the plumage of the young or in the less highly developed sex. Among Celebesian birds the following are some of the more interesting and undeniable examples of ancestral indications in the young.

The Kingfishers of the Oriental genus *Pelargopsis* have the lower back and rump blue, except in the Celebesian area, where *Pelargopsis melanorhyncha* and *P. dichrorhyncha* have these parts buff. The young of *P. melanorhyncha* is known to have the parts in question blue — proof that the species was once so coloured (pp. 269, 270 of text).

The Lories of the subgenera *Trichoglossus* typical and *Psitteuteles* have a yellow (or red) band across the under side of the wing, except in *Trichoglossus ornatus* and *Psitteuteles meyeri* of Celebes, and *P. flavoviridis* of Sula, which have the wing uniform below. Traces of yellow, where the band should be, are often seen in young individuals (occasionally in an apparently adult female) of *P. meyeri*, and now and then in the young of *T. ornatus*, proving that these two species once possessed the wing-band (p. 126 of text).

The Stork, *Dissoura episcopus*, has no contour-feathers, but only down, on the sides of the head and on the neck, though it is not to be doubted that it once had these parts feathered. The young has the sides of the head feathered, and some feathers of blackish brown are produced on the neck, but they soon fall out. These feathers indicate what the species was like at some period of the past (pp. 807, 808 of text).

The Parrots of the genus *Prioniturus* have the two middle tail-feathers furnished with long projecting rackets. Young birds before the first moult display attenuated projecting ends or half-formed rackets (see pl. V, figs. 1, 2), showing, according to the argument pursued below, p. *74*, an earlier stage in the formation of these growths.

The Tree Duck, *Dendrocygna guttata*, has round white spots on the flanks; in the young these spots take the form of stripes similar to those of *D. arcuata* at all ages; a proof that the round spots are a recent development (p. 872). The Blackbird, *Merula celebensis*, when young is spotted like a Thrush (see pl. XXXV).

The little slate-and-vinous Hawks, *Accipiter rhodogaster* and *sulaensis* and *Spilospizias trinotatus* are totally different when young, resembling Kestrels (*Tinnunculus*); and the Pigeon, *Chalcophaps*, in first plumage has no resemblance to the adult (an unusual circumstance among Pigeons), but has the coloration of the Pigeon-genus *Macropygia*. It appears hardly possible to doubt that these are ancestral indications (pp. 25, 26, 650, 652 of text).

The Kingfisher *Melidora* of New Guinea, a curious form with a hooked bill, is held by Sharpe to be the lowest type of the family, and *Cittura* of Celebes and Sangi has the nearest affinities with it, but wants the maxillary hook. When quite young *Cittura* has this hook (p. 307). Though not a feather-character, this point is of equal significance.

It has been already remarked that, when the two sexes are not alike, one (usually the female) seems to show a lower development than the other. It is probable that such females preserve more ancestral features than the males, which have acquired more new features than have the females; yet direct proof of this is hard to find. Among Celebesian birds, a female of *Psitteuteles meyeri* displays, as mentioned above, a trace of the yellow ancestral wing-band; and the rackets of the females of *Prioniturus* are seldom so long as in the males. Indirect proof of the phylogenetic value of the female plumage is furnished when the young of both sexes are like the mother, for such facts as those given above render it pretty certain that the young tend to display ancestral characters. It sometimes happens that the mother and young of one species resemble the adults of both sexes of another species less highly developed than the male of the first.

These considerations place in the hands of the student of geographical distribution an important and (to ourselves) new means of proof in tracing the land of origin of particular species or genera — provided that our supposition be admitted that emigrants, cut off from their native country, are more likely to get altered than the stayers-at-home.[1]) In this manner it has proved possible to trace the genus *Loriculus* (of which over 20 geographical species are known between India and New Guinea) as having originated in Asia, and to construct a genealogical tree of two main branches showing the descent of the species from the Asiatic *L. vernalis* or its ancestor, this species being supposed to have extended its range in process of time across the Archipelago, undergoing some new modification with each change of habitat, viz. with each new isolation. The more eastern forms now throw back by their females and young to more western forms, and in this manner the two branches of the genus finally converge upon a form like *L. vernalis*. The case is fully discussed, pp. 160—169 of text, Map VI.

On similar grounds it is possible to trace the origin of the Blue-and-rufous Flycatcher of Kalao Island to Celebes. The sexes are slightly different, and the male of *Siphia kalaoensis* is the most specialized member of its group; its female is like the male from Djampea Island, *S. djampeana*; the female from Djampea is like the male from Saleyer Island and Celebes, *S. banyumas*, which is thus indicated as having emigrated first to Djampea and later from there to Kalao.

In the same manner the blue back of the young of *Pelargopsis melanorhyncha*

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[1]) For proof see variation in Sangi and Talaut, *antea*, p. 58.

of Celebes may be held to prove the derivation of that species from the blue-backed forms of the Oriental Region, and the indications of a wing-band in the young *Trichoglossus* and *Psitteuteles* of Celebes to demonstrate their descent from the banded species of the Australian Region.

In applying this argument one is apt, however, to stumble on such difficulties as the following. Müller's Green Parrot, *Tanygnathus muelleri*, of the Celebesian area occasionally displays blue on the head when young, suggesting its derivation from the blue-headed *T. luconensis* of the Philippines. But the young *T. luconensis* has the head green, which might be taken as an indication of its descent from the green-headed *T. muelleri*. Is *T. muelleri* descended from *T. luconensis*, and *T. luconensis* from a pre-existing green-headed Parrot, or is the coloration of the head of the young simply due to some chemical condition imposed upon it by the respective parents?

Mr. Keeler (Evolution Colors Birds 1893, p. 178) has suggested, without producing any real proof, that a different colour at the basis of a feather may have a phylogenetic value and denote what the colour of the bird at this spot was at some period of the past. On the contrary our own observations have persuaded us that a different basal colour sometimes shows what colour the feather is going to become. The adult male of the eastern form of the Blue Rock Thrush, *Petrophila cyanus*, has the breast and abdomen chestnut; the immature bird has the feathers of these parts terminally fringed with whitish, next to which is a subterminal bar of dusky, below this usually a little blue, and then a large area above the extreme base chestnut — the colour which the bird will become. Also the jugulum, head and upper parts of the adult are blue, but in the young this blue occupies the basal part of the feathers. Not the base, but the tip of the feather may sometimes have a phylogenetic worth. Evidence of this is shown by the buff-backed Kingfisher of Celebes, *Pelargopsis melanorhyncha*, the young of which by its pale blue back throws back to the other members of the genus, all of which (except another Celebesian form) have blue backs. Now the blue in the young *P. melanorhyncha* is confined to the tips of the feathers; below this they are buff, though there is usually also a faint buff fringe round each feather. In the young of this species the tendency to change into a form with a buff back does not set in in force until the tips of the feathers have already been developed; these tips present the point wherein it agrees with the rest of the genus — apparently therefore a character of long standing, while the buff at the base betrays the character which will soon be assumed.

Hereditary effects of shelter and exposure. — It is proposed here to show some evidence drawn from Celebesian birds that modifications of shape or colour of feathers as caused by the ever-repeated action of mechanical attrition, or by the action of light, are ultimately transmitted to offspring.

The racket-tail-feathers of *Prioniturus*. The two middle tail-feathers are

prolonged much beyond the others, and in adult birds the overreaching portion of these two rectrices is converted into a bare shaft tipped with a spatule of ordinary web (see pl. VI, figs. 1, 4, pl. V, fig. 5). The question of the formation of these racket-feathers has been broached by several writers, especially by Prof. W. Blasius (Ztschr. ges. Orn. 1885, pp. 212—219, figs.). Dr. Finsch remarked (Papag. 1868, II, 401) that the bareness of the shafts was manifestly due to the attrition of the barbs of the feathers; Meyer showed (Ibis 1879, 49) that this view, as of a direct mutilation of the individual, is incorrect, since many specimens were shot by him in which the racket-feathers were growing, and the bare rachis lay upon the surface of the other feathers protected from foreign contact. Prof. W. Blasius has expressed the opinion that the shafts do not grow out naked from the first, but become bare later, owing perhaps to a physiological casting-off of the webs.

The specimens in the Dresden Museum prove that the webs are neither rubbed off, nor bitten off as in the case of the Motmots (see Salvin, P. Z. S. 1873, p. 433). Two specimens figured on plate VI, figs. 2, 3, display the growing racket as found underneath the upper tail-coverts (here removed to show the conditions); the shaft is already webless even where it is still enclosed in the corneous husk or follicle out of which the young feather has grown, and where it could of course be neither rubbed nor bitten. On removing a third younger sprouting racket (♂ ad. *P. platurus*) by the root and taking off the epidermal husk (pl. V, fig. 4), it was found that the web (rami) is present on either side of the shaft, but some of the rami appear not to be attached at all but to run, soldered together, parallel to the shaft almost to its root; other rami have become individually broken off or have fallen off from the shaft, and it was easy to see that, as the feather grew longer, all would have fallen from the shaft. In a growing racket with the shaft 35 mm cut out of the tail of an adult male bird it was not possible to detect any signs of barbs with certainty. Plate VI, fig. 3 displays 44 mm of a growing shaft (♂ ad. *P. flavicans*), which would reach a length of 67 mm (judging from the length of the other perfect racket); this shaft was found to be bare down to its point of attachment by the side of the oil-gland; near the base alone some corneous matter of uncertain determination, but perhaps feather-material, was adhering to it.

These investigations tend to prove that no web at all is produced with long-shafted rackets, but rackets of a lower stage of development have imperfect or unattached webs which fall off before the racket is fully exposed.

The inquiry as to how the middle tail-feathers originally began to be lengthened and narrowed and finally formed into long rackets may be answered by a hypothesis which, if it is a correct explanation of the facts, may be not without weight in its bearings upon theories of heredity.

It is easy to obtain a practical demonstration as to how racket-feathers may be formed by holding a feather by the barrel and scraping the webs with a knife; a bare stem with a spatule at the tip then quickly forms itself, the

yielding pliancy of the tip making it difficult to remove the web from this point without cutting off the end of the feather altogether. In Nature any feather of sufficient stiffness, prolonged so as to stand out beyond the other feathers, will be liable to such a process as this, attrition against the twigs of trees, the walls of their nesting holes etc., supplying the place of the knife. Assumed that the two middle tail-feathers of *Prioniturus* were originally a little longer than the rest[1]), the ends, if sufficiently prolonged, are liable to attrition; and a narrowing of the tips, such as is now seen in the young birds (pl. V, fig. 1), will result. The friction at the ends of the feathers causes irritation to the roots; an increased supply of blood ensues there, with the result of an increased size of these feathers. These longer feathers are more liable to attrition, and half-formed rackets (pl. V, fig. 3) take shape; the increased irritation and consequent lengthening of the feather results in the production of other stages (pl. V, fig. 4), up to the most advanced development of the present time (pl. VI, fig. 1). Yet the striking features shown in the plates were not obtained in one generation, as has been proved; on the other hand this appears to have been a process of ages, more and more advanced results being obtained in successive generations and transmitted by heredity. The simplest stages of this formation are displayed by young birds in first plumage which in respect of the tail probably resemble the first ancestors of the genus (pl. V, fig. 1); the second moult, when the webs are often quite absent on the shafts of the rackets, which are about half the full length in old birds, seems to show a later period in the history of the race; while the highest development of these feathers, as seen in old birds (especially males) of the present day, is probably the most recent stage in the evolution of the genus.

The following are the arguments in proof that these rackets are the inherited effects of attrition:

1. It has been shown that such can easily be formed artificially by scraping, the size of the spatule depending upon the stiffness of the feather.

2. Where the shafts are not exposed to attrition they are not bare. It is only on the projecting part of the middle tail-feathers that the shafts are bare; and as far as the ends of the lateral feathers, by which the middle ones are protected from attrition, they are fully webbed. If the bareness were due to something else, it might be expected that the naked shaft would not in every species[2]) arise just at this point of the tail, but sometimes much higher up, or sometimes much lower down[3]).

3. Rackets do not occur on unexposed feathers sheltered from attrition.

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[1]) A very common condition in birds.

[2]) We have examined *P. luconensis*, *cyaniceps*, *suluensis*, *discurus*, *flavicans*, *platurus*, and the plate of *verticalis*.

[3]) Genera in which the racket-feathers are longer and consequently heavier (e. g. *Bhringa*) usually have larger spatules and the attenuation of the webs on the shaft continued towards the base of the tail — a result of friction upon the other feathers.

4. Rackets are present in birds having no affinity with one another, and in the most varied positions on the wing, tail, or head, where a sufficiently stiff feather projects so as to be liable to attrition. Thus they are found on projecting feathers on the sides of the head in the Paradise-bird, *Parotia*, on the projecting second primary of the Nightjar, *Macrodipteryx*, on the overreaching tail-feathers of *Prioniturus*, of the Indian Drongos, *Bhringa* and *Dissemurus* (the web of the racket on the outside only), of the Kingfishers of the genus *Tanysiptera*, etc.

5. Remains of the web are often to be found on the shaft of the racket (pl. V, fig. 5).

6. There appears to be no other means of accounting for the origin of these racket-feathers. They are not sexual characters, nor is it conceivable that they are useful and hence developed by natural selection. The theory of "recognition markings" fails, because they are not present in the young and because they are present and very similar in different species living in the same localities (e. g. *Prioniturus platurus* and *flavicans*).

7. The Motmots of America have the curious habit of forming rackets artificially on the lengthened middle tail-feathers by biting or tearing off the web behind the tip. The result appears now to be partially inherited, since a very pronounced narrowing of the web here is seen in young birds (see Salvin, P. Z. S. 1873, pp. 431, 432 with figures). The habit of tearing away the web also appears to be inherited, for young birds reared by hand began to tear away the webs of the middle tail-feathers when these had reached their full length (see Cherrie, Auk 1892, 323).

As an argument against the loss of the webs through attrition during the individual development, it has been pointed out that when a narrow fringe of web is found on one side of the shaft, it is almost always on the outside that this occurs, where it is said that it would be most likely to get rubbed (Meyer and W. Blasius, ll. cc.). Due weight should, however, be given to the following considerations: first, birds rarely spread out their tails except in flight, and in the position of rest one middle tail-feather lies over the other so that little of the latter is seen, and the inner web of the one racket would receive a good deal of the pressure and friction put upon the outer web of the other; and second, the webs on the inside would be liable to get crossed, interlocked, sawed and broken by one another.

The attenuated tail-feathers of *Merops*. The two middle tail-feathers of all the species of Bee-eaters of the genus *Merops* are prolonged beyond the others when the bird is adult; the tip is not furnished with a spatule as in *Prioniturus*, but attenuated for its terminal projecting portion and for a little distance on the non-projecting part (see plate VIII, fig. 1). These attenuated ends are not formed by attrition at the sides during the lifetime of the individual, as is shown by young feathers sprouting out of the follicles thus perfectly developed (see pl. VIII, figs. 2, 3). Yet the argument for attrition continued during gene-

rations without number applies equally well here. The habits of *Merops* are very different from those of *Prioniturus*; the Parrot breeds in holes in trees, but the Bee-eater forms a burrow, like the hole of a mouse or rat, for a depth of one to three metres in a bank of sand or earth. The friction caused by the sand, against which the terminal portion of the feather is chiefly brushed, seems sufficient to account for this peculiar shape. If a feather of ordinary shape be taken, and rubbed and drawn between two sheets of sand-paper, a ragged similitude of a *Merops*-rectrix may be obtained. [1])

Other cases. If once the theory that the racket-tail-feathers of *Prioniturus* are the inherited results of attrition is admitted, a principle is arrived at by which a host of other cases are capable of explanation. Among feather-formations may be mentioned: the bifid tips of the remiges of *Merops* and *Hirundo*, explicable by the habit of these birds of supporting themselves on their wings when commencing their nests (for *Merops*, see p. 252, note), the oscillation of the body forcing the webs apart at the tips of the feathers and so forming a little notch, just as is done by rubbing the tip of a feather on blotting-paper or by knocking the tip gently with the finger; the stiff, tapering tails of Woodpeckers and *Nasiterna*, stimulated to strong growth and worn down to shape by the habit of using them as a prop in climbing; the curiously attenuated first primaries of many Hornbills and Pigeons, so shaped by the friction caused in flight to these reduced quills which lie under the other remiges, against which they vibrate and by which they are rubbed; the narrowing of the outer webs of the lateral tail-feathers of all birds and the gradual increase in width of these webs from one feather to another until on the two middle feathers they are of approximately equal width, the middle feathers being protected by the lateral ones from the friction of objects against which the tail is repeatedly getting brushed, the lateral feathers being exposed to this attrition, — most of all the outermost pair in which the outer web is narrowest. Also in the narrowing of the outer webs of the remiges, though feathers of this shape are apparently essential to flight, mechanical attrition, caused by the rush of air in flight, may have worked together with natural selection in determining their shape. The friction may have acted as a stimulus to the lengthening of these feathers which are far larger and stronger than contour-feathers. Other parts may be modified in the same manner as feathers by the inherited effects of wear and tear: such as the bills of *Anastomus*, *Esacus* and *Demiegretta*, worn away so as no more to close properly by the rough shells and crustaceans upon which the birds feed; the bill of adult Hornbills not meeting for a space where the bird lays hold of objects in climbing and feeding and even swings from them on occasion suspended by its bill (see, Legge, B. Ceylon 1880, p. 274); the skin of the head of the Cock, drawn out into a comb and with the formative feather-

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[1]) See also Meyer's remarks on and figures of the two lengthened middle tail-feathers of *Paradisea minor* etc. in Abh. Ber. Mus. Dresden 1898/9 Nr. 2 p. 44 plate II.

papillae destroyed by the beaks of antagonists; the face of the adult Rook from which the feathers fall at the base of the bill as a result of dirt and wear for generations; the head and face of the adult Moleo, naked owing to ages of attrition from the sand in which it burrows; and so on. Examples drawn from man and other animals could be given. The principle is of importance, as a cause of, or directive stimulus to, variation; it should therefore not be accepted without criticism. For some cases the principle of natural selection affords an explanation (e. g. the remiges), but for others the argument furnished thereby can hardly be made to commend itself to impartial judgment (e. g. the rectrices), and for others again this principle appears to fail completely (e. g. the rackets of *Prioniturus*, the comb of the Cock[1]).

Effect of light. In course of time most colours in mounted specimens and skins of birds fade with exposure to the light. Among Celebesian birds the effect is particularly well seen in the buff of the Nutmeg Pigeons and the wash of salmon-colour on the under parts of the Moleo, which soon fade in exposed skins, leaving the respective parts white. Nor does light seem to be operative solely upon the dead.

Where the wing rests upon the body. — In nearly all birds a change of colour takes place on the under side of the remiges where they rest upon the body with the wing closed, so that this part differs from the distal ends and more external parts of these feathers. Sometimes merely a slight change of gloss is seen, but all stages of difference may be found from this up to the most marked contrasts. Among Celebesian birds some of the most striking examples are: the Cuckoo-shrike, *Graucalus bicolor*, with the remiges white below where they rest upon the body, black on the other portions; the Parrots, *Prioniturus Loriculus*, with the remiges below verditer-blue against the body and partly where they cover one another, black elsewhere; the Roller, *Coracias temmincki* — remiges blue against the body, black changing with the light to bronze on the free parts[2]); the Flycatcher, *Zeocephus*, with the said parts ferruginous and blackish respectively; and so on. A tendency to blackness is generally seen on the distal ends and external portions of these feathers.

Where the tail-feathers are concealed by the upper tail-coverts. — A change of colour in the shafts and webs of the rectrices is generally seen on their concealed bases, very commonly a tendency to paleness or white, suggesting a loss of pigment. The most striking examples occurring in Celebes are the Cuckoo-shrike, *Graucalus bicolor*; the two Nutmeg Pigeons, *Myristicivora bicolor* and *luctuosa*; the Pratincole, *Glareola isabella* (as also *G. orientalis*). In these birds all that part of the tail which is concealed by the upper tail-coverts is white, and all

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[1]) As shown by Stolzmann (P. Z. S. 1885, 430) this may bring disaster to the wearer of it, but the author attempts to explain this by natural selection.

[2]) On the upper surface of the remiges these colours are reversed, being blue above where they are bronze below, and bronze above where they are blue below, but the lines of demarcation do not exactly coincide.

the terminal exposed part is black, the division of the colours being sharply conterminable with the tips of the longest upper tail-coverts.

The concealed bases of the contour-feathers. — Here again a difference of pigmentation or of gloss, or of both, is seen, the bases being usually of paler or duller hues than the tips. Thus the bases of the contour-feathers in *Corvus enca* are white, the terminal portions glossy black; in the Parrot, *Aprosmictus sulaensis*, the bases are grey or greenish, the exposed terminal portions bright blue on the mantle; and so on.

Apart from the phylogenetic value of the different parts of a feather, there is convincing evidence that light must be cited as an important agent affecting the distribution of the pigments of a feather, either through physiological stimulation, or direct action, or both. No better test case could be found than the male of the Celebesian Cuckoo-shrike, *Graucalus bicolor*. Seen from above with its wings closed it is a black bird, for, though the rump and upper tail-coverts are white, these parts are then probably concealed by the wings. The under surface is white. The wings and tail are black; yet that part of the tail which lies hidden beneath the upper tail-coverts is white, and so is the wing below where it rests upon the sides of the body; also the black contour-feathers of the upper parts are white on their concealed bases. It may be said that wherever the feathers are exposed to the sun they are black; where they are in shadow or concealment they are white. It is preferable to attempt no explanation of these facts here, but it seems permissible to suggest that the case is similar to that of *Prioniturus*, the difference being that the inherited effects of attrition are assigned as the cause of the formation of the racket-feathers of the Parrot, whereas the action of light is regarded as having in the course of generations in some way brought about the distribution of the pigments in *Graucalus*.

Direct evidence of the action of sunlight upon plumage is afforded by the following statement. As Dr. Russ writes: "The Goldfinch when kept caged in a dark place often becomes black, and even in a light room the bright colours after moulting often appear fainter and more impure, but this can be prevented if the Goldfinch is placed as much as possible in the open air and sun" (Einheim. Stubenvög. 1873, II, 265).

The soft, glossless plumage of nocturnal birds, viz. Goatsuckers and Owls, also calls for consideration in this connection, as well as examples already suggested, and innumerable other ones in which the action of light, or the want of it, appears less obvious.

5. GEOGRAPHICAL DISTRIBUTION.

In the intermediate seas between the Euro-asiatic and the Australian continents there is stretched out the largest and most numerously membered archipelago of the earth, with a fauna and flora derived partly from the West and partly from the East. Where do we now find the frontier of these two faunas and floras, which contrast so strongly with one another in their extreme forms; or do they pass into one another so insensibly that a sharply defined frontier cannot be traced? It would be very premature to attempt a sketch of the geological history of this region of the earth in view of the quite insufficient knowledge available concerning the living and, especially, concerning the extinct fauna and flora of the Archipelago, for we are acquainted with only a small fragment of the latter (the extinct); we must content ourselves with an attempt to answer the above interesting question with the aid of the rather better established data of the present time[1]), and, in accordance with the character of our book,

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[1]) The status of geological knowledge as to Celebes is very defective as yet, though some valuable work has been done recently and more is to be expected from Drs. P. & F. Sarasin. In this state of things we have found it preferable to abstain entirely from discussing the past history of the island, but give some of its literature, where references to further geological, palaeontological and mineralogical papers are to be found:

1883. K. Martin: Wiss. Aufg., welche der geologischen Erforschung des Indischen Archipels gestellt sind. (Lecture. Leyden, Brill). Id.: Die wichtigsten Daten unserer geologischen Kenntniss vom Niederl. Ost-ind. Arch.: Bijdr. taal- land- en volkenk. van Ned. Ind., uitg. ter gelegenheid van het 6. intern. Congres der Orientalisten te Leiden. Land- en volkenkunde. 1883, 17 (Celebes p. 23) with summary of literature.

1888. C. M. Kan: Bodengesteldheid der eilanden en diepte der Zeeën van den ind. Arch.: Tdschr. Ned. aardr. Gen. (2) V (Versl.), 202, Kaart IV.

1890. K. Martin: Die Kei Inseln und ihr Verhältniss zur australisch-asiatischen Grenzlinie, zugleich ein Beitrag zur Geologie von Timor und Celebes: Tdschr. Ned. aardr. Gen. (2) VII, 241. Id.: Zur Geologie von Celebes: l. c. 1891 VIII, 180.

1890. A. Wichmann: Bericht über eine ... Reise etc. II. Celebes. l. c. (2) VII, 921 Tab. II; 1892 IX, 258. Id.: Die Binnenseen von Celebes: Petermann's Mitth. 1893, 215 Taf. 16. Id.: Petrogr. Studien über den Ind. Arch. I. Leucitgesteine von der Insel Celebes: Nat. Tschr. Ned. Ind. LIII, 315, with plate. 1895 II. Zur Geol. der Insel Saleyer: l. c. LIV, 236 pl. V.

1894. W. F. van Vliet jr.: De verticale ligging en de geologische bouw van Celebes: Tdschr. gesch., land en volkenk. 9. Jaarg., 257 (with summary of literature).

1895. I. W. Retgens: ... Gesteenten van Celebes: Jaarb. Mijnwezen in Ned. Oost-Ind. 24 Jaarg., 124.

1896. Encyclopaedie van Ned. Indië (by van der Lith and others) I, 317 (s. a.). A general report on the geological formation of Celebes.

1896. K. Martin: Zur Frage nach der Entstehung des ost- und westindischen Archipels: Geogr. Zeitschr. II, 376.

It is nearly the same with the flora of the Archipelago. Though relatively much is already known, we are very far from a thorough knowledge, which would enable us to draw trustworthy conclusions. We, therefore, likewise abstain from touching these questions, which are discussed in the works of Grisebach (Vegetation der Erde 1872, Ges. Abh. u. kl. Schr. zur Pflanzengeographie 1880), Engler (Versuch einer Entwicklungsgeschichte der Pflanzenwelt, insbesondere der Florengebiete seit der Tertiärperiode 1882), Drude (Die

restrict ourselves to the ornithological facts at our disposal, taking the Avifauna of Celebes as the basis for this purpose. Conclusions which may be drawn from ornithological facts alone must, however, be weighed very carefully, as birds have their own modes of dispersal. We shall then see in how far these conclusions differ from those arrived at by other means.

Wallace's line.

As is generally known Mr. Wallace drew a line to the west of Celebes by which the Archipelago was divided into two widely differing halves. This division was welcomed with much approbation on account of the fascinating speculations of its inventor, though these speculations were more suggestive than substantially founded upon and backed by facts, some of which were not taken into consideration, and others were not available with our defective knowledge of 20 or 30 years ago, nor indeed are they available to-day.

Mr. Wallace has, however, in the course of his later studies modified his views in some respects. At first, as in the "Malay Archipelago" (1869) and in the "Geographical Distribution of Animals" (1876) — not to mention earlier writings[1]) — the line passes between Bali and Lombok, through the Macassar Strait west of Celebes, turning to the east between Mindanao and Halmahera; while he adds in "Island Life" (1880, 431) "that the present land of Celebes has never (in Tertiary times) been united to the Asiatic continent, but has received its population of Asiatic forms by migration across narrow straits and intervening islands". He draws in the latter work (p. 434) the following conclusion: "We have in this island a fragment of the great eastern continent which has preserved to us, perhaps from Miocene times, some remnants of its ancient animal forms"; and (p. 509): "I now look upon Celebes as an outlying portion of the great Asiatic continent of Miocene times, which either by submergence or some other cause had lost the greater portion of its animal inhabitants and since then has remained more or less completely isolated from every other land. It has thus preserved a fragment of a very ancient fauna along with a number of later types which have reached it from surrounding islands by the ordinary means of dispersal". He further says in his "Australasia" (ed. by Dr. Guillemard 1894, p. 287): "The peculiarities of the animal life of Celebes may be best explained by supposing it to be an outlying portion of that Miocene continent, which became detached from it, and has since never been actually joined to any Asiatic or Australian land. It has thus preserved to us some descendants of ancient types, and these have become intermingled with such immigrants from both east and west as were enabled to establish

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Florenreiche der Erde, Petermann's Erg. Heft Nr. 74 1884, Atlas der Pflanzenverbreitung 1887, Handbuch der Pflanzengeographie 1890), Warburg (Die Flora des asiatischen Monsungebietes: Verh. Ges. Deutscher Naturf. Allg. Theil 1890, especially concerning South Celebes), etc.

1) These earlier writings are to be found in the Ibis 1859, 450; J. of the Proc. Linn. Soc., Zool., 1860, IV, 172; P. Z. S. 1863, 481; J. R. Geogr. Soc., 1863, XXXIII, 217; Edinburgh Philos. Journ., new ser., 1864, XIX, Nr. 1, etc.

themselves in competition with the ancient inhabitants. To the naturalist, therefore, Celebes is an island of extreme interest. It cannot be said to belong either to the eastern or the western divisions of the archipelago, but to stand almost exactly midway between them; the relic of a more ancient land, and dating from a period perhaps anterior to the separate existence of any of the islands."

If we now glance over the scientific literature on "Wallace's line", as Huxley baptised it (P. Z. S. 1868, 313), it should be understood that we do not pretend to give an exhaustive extract, but only quote such writings as have been within easy reach or which have appeared sufficiently characteristic. There are also heaps of other books and papers in which Wallace's line is mentioned.

E. Blyth, in 1871 (Nature III, 428), recognizes the line. He has a Celebesian Sub-region of the Melanesian Region and it comprises: Celebes, Lombok, Sumbawa, Flores, Wetter, Timor and Sandalwood Island.

J. Pijnappel, in 1872 ("Enkele aanmerkingen op Wallace's Insulinde": Bijdr. taal, l. en vk. Ned. Ind. 3. ser. VII, 159), made some serious objections and is of opinion, that as Geography, Anthropology, Ethnography and Botany are opposed to the line, Zoology alone cannot uphold it; the less so, as it sometimes requires the most hazardous hypotheses as to geological convulsions, upheavals and submergences in order to explain the occurrence of a single mammal.

A. v. Pelzeln in a paper entitled "Africa-Indien", published 1875 (see: Verh. z.-b. Ges. Wien p. 33), adopted the line; he considered Celebes as belonging to the Australian Region and enunciated as peculiar bird-genera (p. 48): *Monachalcyon*, *Cittura*, *Ceycopsis*, *Artamides*, *Gazzola*, *Streptocitta*, *Scissirostrum*, *Enodes*, *Basileornis*, *Prioniturus* and *Megacephalon*. He takes as identical (p. 47) *Scops manadensis* from Celebes and Madagascar, and *Ortygometra flavirostris* from Celebes and Africa, and mentions eighteen species which are common to the Ethiopian and the Indo-Malayan Region. In 1876 he confirmed his general conclusion in a paper on the Malayan mammalia (see: Festschr. z.-b. Ges. p. 53).

P. J. Veth, in 1875, gave a lecture on the line before the International Geographical Congress in Paris ("Observations sur les lignes de Wallace": C. R. Congr. Int. des sc. géogr. à Paris, 1878, 305), and treated the matter with the acumen usual to him. He said that it rests on an inadequate basis hydrographically, that the flora was not taken into consideration, that Wallace only referred to mammals, birds, some insects and land-shells instead of to the whole fauna; that it is, therefore, zoologically insufficiently proved, and that it is not evinced by the facts of anthropology (see, also, l. c., p. 276 and Veth's translation of Wallace's paper: "Over de physische Geogr. van den Ind. Arch.", with notes, Zalt-Bommel, 1865).

J. A. Allen, 1878 ("The Geographical Distribution of the Mammalia considered in relation to the principal ontological regions of the earth and the laws that govern the distribution of animal life": Bull. of the U. S. Geol. and Geogr.

Survey, vol. IV, 363—377), is one of the few earlier zoologists who do not recognise Wallace's line. His Indian Region, being part of the Indo-African Realm, has for its eastern frontier a line drawn west of the Moluccas and Aru. He says (p. 358): "I fail to see any good reason for assigning Celebes and all the smaller Sunda Islands to the Papuan Province, as Mr. Wallace and others have done, but abundant evidence that such is not their real affinity." And p. 364: "The Australian Realm will be here restricted so as so embrace none of the islands situated to the westward of the Moluccas."[1]) His Insular or Malayan Province forms part of the Indian Region; it includes all the Sunda Islands, the Philippines and Celebes. His Papuan Province (p. 367) takes in the Molucca and Aru Islands to the west, but he considers the Molucca Group (p. 364) to be a transitional link between the Indo-African and the Australian Realm, faunistically more loosely allied to the latter than to the former.

K. Semper, 1880, in his work: "Die natürlichen Existenzbedingungen der Thiere" (II, 136), discussed the problem fully. Though he found that facts do not speak everywhere in favour of Wallace's line, he was nevertheless inclined to adopt it in a general way; he explained the differences of the faunas to the east and west not, however, by former land-connections, but by the sea-currents transporting the animals, a hypothesis which, as far as we are aware, has not been accepted elsewhere.

O. Krümmel, in 1882, published (see: Ztschr. wiss. Geogr. III, 1, Taf. I) an important map: "Tiefenkarte des australasiatischen Mittelmeeres", on which he drew the line, but remarked (p. 2) that the depths of the Macassar Straits are quite insufficiently known and (p. 3) that in the Straits of Lombok only one sounding very near the coast of Bali, which was broken off at 50 fathoms, serves as a basis for the assertion that a deep gap in the chain of islands exists here! He further mentioned (p. 5) that there are no soundings whatever known from the three large gulfs of Celebes.

K. Martin, in a lecture on the "Wissenschaftlichen Aufgaben, welche der geologischen Erforschung des Indischen Archipels gestellt sind", held in Leyden in the year 1883, considered the line entirely erroneous. In his opinion (p. 28) the continental frontier between Asia and Australia is approximately identical with the chain of volcanoes in the Archipelago. The same author says in a paper: "Die wichtigsten Daten unserer geologischen Kenntniss vom niederländisch Ost-indischen Archipel" (see: Bijdr. taal-, land- en volkenkunde Ned. Ind. uitg. ter gelegenheid van het 6. intern. Congress der Orientalisten te Leiden, Land- en Volkenkunde. 1883, 27): "As far as our knowledge of to-day goes, Wallace's line is geologically unjustifiable. . . . Nothing hinders us from drawing

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[1]) Previously (Bull. Mus. Comp. Zool. Cambridge, 1870—71, II, p. 381) Mr. Allen had uttered the following opinion: "The Australian Realm embracing Australia, New Zealand, New Guinea and their dependent islands, including those to the eastward [?] as far as Timor and Celebes, is zoologically as distinct . . ." This is not at all clear to us, but as this prominent writer later (see above) was quite intelligible, it is not necessary to discuss his former intimation.

the frontier to the north-west of Timor; the sea-depths would allow it just as well, and in this case at least a separation of geognostically different regions would be attained." (A. Wichmann, however, appears to reckon Timor, etc., to the former Asiatic continent, see: Samml. des geol. Reichs-Mus. in Leiden, I. Ser. Bd. II, p. 201, 1887.)

O. Drude, 1884 ("Die Florenreiche der Erde": Erg. Heft Nr. 74 zu Petermann's Mitth. p. 62[b]), acknowledges the line as a floristic frontier, to which opinion he still adheres in 1890 ("Handbuch der Pflanzengeographie", p. 150 and Map I; see also: "Atlas der Pflanzenverbreitung" Berghaus' Phys. Atlas. 5, No. 1, 1887).

A. Heilprin, 1887 ("The Geographical and Geological Distribution of Animals" p. 107, and map), adopts an Austro-malaysian Transition Region, which is bounded to the west by Wallace's line, to the east and south by New Guinea and Australia, to the north by Mindanao.

W. Marshall, 1887 ("Atlas der Tierverbreitung": Berghaus' Phys. Atlas. VI. Abth. p. I[a], Map III), simply adopts the line.

C. M. Kan, in a paper published in 1888 on the "Bodengesteldheid der eilanden en diepte der Zeeën van den ind. Archip." (see: T. Ned. Aard. Gen. 2. ser. vol. V. Meer uitgebreide art. p. 219, with map IV) does not recognize the line for reasons indicated in the title of his paper.

A. Reichenow, in 1888 ("Die Begrenzung zoogeographischer Regionen vom ornithologischen Standpunkt": Zool. Jahrb. Abt. f. Syst. III, 699), recognizes an Eastern Zone with an Eastern Temperate Region, an Ethiopian Region and a Malayan Region as far as Wallace's line (see also map XXVI), and a Southern Zone which extends to the west up to Wallace's line; he, therefore takes Celebes as non-Oriental.

R. Schuiling, in a special dissertation: "De grenslijn van Wallace eene continentale grens", 1888 (T. Ned. Aard. Gen. 2. ser. V, p. 523), came to the conclusion (p. 548), that Geology, Zoology and Oceanography teach: "Celebes belongs to Asia".

F. A. Jentink, in 1889 (l. c. VI, 244), showed (p. 246), that we are very far from such an adequate knowledge of the mammals of Bali and Lombok as to justify Wallace's affirmation (Island Life 1880 p. 4): "Bali and Lombok differ far more from each other in their birds and quadrupeds than do England and Japan," neither was Wallace justified in basing an argument on 16 land-mammals as the ascertained number from Celebes, because as early as 1878 21 were already known and this large island has not been at all thoroughly investigated yet. In 1888 there were already 26 land-mammals and 19 bats extant from there, a number which is probably still far from the true total. There was therefore no good reason whatever for drawing important conclusions with such scanty knowledge.[1])

[1]) We can only point to Mr. Whitehead's recent discoveries of mammals on the high mountains of the Philippines (see: Ann. Mag. N. H. 1895, 6. ser. vol. XVI, 160), in the conviction that such an experienced

E. Reclus, 1889 (Nouv. Géogr. univ., vol. XIV, 209) sticks to the line and says: "De tous les côtés elle [Celèbes] apparait isolée; c'est une terre dont l'isolement complet est un fait géologique datant des ages les plus reculés"(!).

E. v. Martens published in 1889 his "Tagebuch-Notizen" from Banda, Timor and Flores (see: Z. d. Ges. f. Erdk. zu Berlin, vol. 24, p. 83) and concludes (p. 104) that Timor, Celebes, the Philippines, and the islands east of Java represent the region of intermixture of the eastern and western animal worlds and may just as well belong to neither as to both. "Nearly every zoological genus presents a different frontier, a sharply defined common frontier does not exist in nature, nor here."

O. Warburg remarked in 1890 ("Die Flora des asiatischen Monsungebietes": Verh. Ges. Deutsch. Naturf. Bremen, Allg. Theil, p. 15 of sep. copy) that important as Wallace's line is for understanding the evolution of the floras in detail, the character as a whole was not altered by the separation; the greatest part of the present flora would have already transmigrated before the separation, thus certainly long before Miocene times.

K. Martin in a paper of 1890: "Die Kei-Inseln und ihr Verhältniss zur Australisch-Asiatischen Grenzlinie" (Tdschr. Kon. Ned. Aardr. Gen. 2. ser. VII, 273) says: "To the west of Great Key and to the north-west of Timor lies a natural and geognostically well-founded line of separation between the islands dismembered from the Asiatic and Australian continents." He adds, however, that it is not to be expected that on the continental borders the present faunistic and floristic character of single islands should have a direct connection with the geological line of separation or be congruent with it, because peripheric parts of the continental masses are at times connected or separated.

E. L. Trouessart, in 1890 ("La Géographie Zoologique", pp. 89, 131, 243 and map p. 9), simply accepts Wallace's line.

E. v. Martens showed in 1891 ("Landschnecken des Indischen Arch.": Weber's Zool. Erg. II, 263) that the land-shells do not allow of a sharp line being drawn between Celebes and Borneo, though they differ considerably, for North Celebes cannot be separated from the Philippines, and the differences between Java on the one side, and Flores and Timor on the other, are less conspicuous. The region to the east of Celebes does not offer any uniformity with this island and cannot be regarded as constituting a unit with it.

P. L. Sclater, who, as is well known, first divided the earth into six ornithological regions now widely adopted for animals in general ("On the general Geographical Distribution of the Members of the Class Aves": J. Proc. Linn. Soc. 1858 II, 130—145)[1]) in 1891 recognised the line ("On Recent Advances in our knowledge of the Geographical Distribution of birds": Ibis, p. 515), though he gave Celebes a special heading (p. 530) and says (p. 533) that Celebes is "a

collector as he would gain a similar harvest on the high mountains of Celebes, which rise to nearly 10 000 feet, and from where next to nothing is as yet known.

[1]) See, also, his lecture on "The Geogr. Distribution of Mammals" Sc. Lect. f. the people (6) 1874 p. 80.

debatable land between the Oriental and Australian Regions, but more properly attributable to the former".

W. H. Flower & R. Lydekker, in 1891 (Introd. to the Study of Mammals p. 102), regard Celebes as the typical representative of the Austro-Malayan transitional region or sub-region, but they do not define it and do not recur to Wallace's line (except on p. 97).

P. A. van der Lith, 1893, gave (Nederl. Ost-Indië, 2. ed. I, 11) a sketch of the facts and views concerning the line, but was inclined not to adopt it. A very readable résumé is to be found in J. F. van Bemmelen's book: "Uit Indië", 1895, p. 146 et seq.

E. Haeckel in 1893 ("Zur Phylogenie der australischen Fauna" in Semon's Zool. Forschungsreisen, I p. V) adopts the line without entering critically into this difficult and complicated question, though he presents us with the following astonishing affirmation: "An keinem anderen Punkte unserer Erde stehen zwei benachbarte Thiergebiete in so auffallendem Gegensatze, als auf der schmalen Grenze zwischen der indo-malayischen und austral-malayischen Region. Überschreiten wir die schmale Meerenge am Südende dieser Grenze, die tiefe Lombok Strasse, so treten wir mit einem Male aus der Gegenwart in das mesozoische Zeitalter [!]. Obgleich die beiden Nachbar-Inseln Bali und Lombok nur wenige Meilen entfernt und im Allgemeinen denselben klimatischen Bedingungen unterworfen sind, erscheint dennoch die charakteristische Landesfauna derselben gänzlich verschieden; und noch mehr gilt das, wenn wir die Mangkassar Strasse überschreiten und von dem indischen Borneo nach dem australischen Celebes übersetzen. Der durchgreifende Gegensatz ihrer Vogel- und Säugethier-Welt ist so gross, dass er zu den schlagendsten chorologischen Argumenten des Transformismus gerechnet werden muss." (!)

W. Haacke, 1893, simply adopts the line (Schöpfung der Thierwelt" p. 238).

A. Newton, also in 1893, ("A Dictionary of Birds", p. 317—363, and Map facing p. 1), likewise accepts the line. Concerning Celebes he says: "To the Papuan Region may be assigned, though with doubt, the wonderful island of Celebes, presenting perhaps more anomalies than any other in the world, and yet anomalies which, by the use of strictly scientific inference (as Mr. Wallace has shewn us), may possibly tell a story that sounds so romantic and yet will satisfy those who judge it more severely".

R. B. Sharpe, likewise in 1893 ("On the Zoo-Geographical Areas of the World, illustrating the Distribution of Birds": Natural Science III, 100 and map), applies the Wallace-line as western frontier to his Australian Region; he recognizes a Celebean Sub-Region, which, with the exception of the Sula Islands, coincides with our Celebesian area, and a Moluccan Sub-Region, comprising everything between Lombok, a line east of Celebes, New Guinea and Aru to the east, and Australia to the south.

F. H. H. Guillemard, when editing Mr. Wallace's "Australasia" in 1894, likewise appears to have neglected literature when he says (p. 347 — a passage

not in the first edition of 1879, p. 419, and we are not aware whether it is in subsequent ones): "We thus have the Sunda Chain divided distinctly and definitely into an Asiatic and an Australian portion, the dividing line coinciding with the deep-sea channel existing between Bali and Lombok. This boundary is now universally known as 'Wallace's line'".

M. Weber, 1894, in his important paper: "Die Süsswasser-Fische des Indischen Archipels, nebst Bemerkungen über den Ursprung der Fauna von Celebes" (Zool. Ergebnisse III, 468) came to the result that Celebes has no Australian, but a highly impoverished Indian character in its fish-fauna, and remarked as to the general problem (p. 473): "The unhappy line of Wallace, which he himself has not formally retained for Celebes, has worked its way deeply into the brains of numerous zoologists as something fascinatingly simple. Text-books which touch upon zoogeography and get rid of the subject in a few words maintain their hold on this classical frontier. And thus the Australian Fauna of Celebes lives notwithstanding various protests." Prof. Weber concludes (p. 476): "The original line of Wallace separates groups of islands, of which the western (Borneo, Sumatra and Java) received, on account of their size, but chiefly in consequence of their longer connection with the Indian continent, a rich Oriental fauna and, therefore, have developed specific forms of Indian character. Of the eastern, Celebes was first separated from the Indian continent and remained cut off. In consequence, it retained single older forms, which developed independently. — Consisting in earlier times of single smaller islands, its fauna has remained poor."

F. E. Beddard, in 1895 ("A Text-Book of Zoogeography"), recognises Wallace's line (p. 103 and frontispiece-map) as a frontier between the Oriental and the Australian Regions (p. 103 and 113), though (p. 113) he says that Celebes "probably" belongs to the latter, but (p. 106) treats of it under the heading of the Malayan Sub-region of the former.

R. Lydekker in 1896 ("A Geographical History of Mammals", p. 45 and map), adopts Heilprin's Transition Region (see above) as an Austro-Malayan Region and as one of four Regions of the Notogaeic Realm (p. 27): "Poverty, and an admixture of Australian and Malayan types, with a very marked preponderance of the latter, are the leading features in its mammalian fauna". He says, however, that from the living mammalian fauna one might be inclined to place the whole area within the limits of the Oriental Region. He evidently hesitates in giving Celebes a fixed position, the more so as "there is absolutely no palaeontological evidence to help us in regard to past history".

C. Hedley ("Mollusca of the Oriental region": Journ. of Malacol. IV, 53) showed, 1895, that the line between Bali and Lombok has no value for the Mollusca, as the land-shells of these two islands do not differ essentially.

Likewise E. v. Martens showed in 1896 (Sb. Ges. natf. Freunde zu Berlin p. 157), that of 10 land-shells from Lombok 3 are geographically neutral, 4 are

assigned to the great Sunda Islands, 3 to the eastern islands, that, therefore, no sharp frontier exists for land-shells between Bali and Lombok.

The same eminent conchologist said in 1897 ("Süss- und Brackwasser-Mol. des Indischen Archipels": Weber's Zool. Ergebnisse IV, 298): "The frontier between Bali and Lombok is for the fresh-water Mollusca quite imaginary, as long as we know next to nothing of the species living on these islands;" and he proved further (p. 297) that the fresh-water Mollusca from South Celebes are most closely allied to those of Java and Flores, those of North Celebes most closely to those of the Philippines, which is not consistent with Wallace's line, but with the geographical position.

A. Supan, 1896 ("Grundzüge der physischen Erdkunde", p. 557, and Maps XIX, XX) sticks to the "celebrated" line.

W. Kükenthal, in 1896 (Abh. Senckenb. Naturf. Ges. XXII, 130), abnegates Wallace's line.

W. L. Sclater, 1896, treating of the Mammals of his Celebesian Subregion ("The Geography of Mammals": Geogr. Journ. VIII, 388 with Maps), finds that the Australian element in the mammalian fauna of Celebes does not in any way require the supposition of an ancient land-connection with that Region, but that the greater amount of Oriental forms suggests such a former connection with Asia; he, therefore, annexes the Celebesian Subregion to the Oriental and not to the Australian Region. In the beginning of this important paper (l. c. 1894, III, p. 97, with Map, and IV, p. 35, with Map) Mr. Sclater draws Wallace's line to the east of Celebes and between Bali and Lombok (see, also, l. c VIII, p. 378) and takes this as the frontier between the Australian and the Oriental Region, reckoning the Sula Islands to the former, Celebes to the latter, as "on the whole the evidence of the mammals, at any rate, serves to connect it more closely with the Oriental Region" (see l. c. IV p. 36).

F. J. Niermeyer, finally, in 1897 ("De Geschiedenis van de lijn van Wallace": Tijdschr. Kon. Ned. Aard. Gen. 2. ser. XIV, 758), has given a very readable historical sketch. He rightly censures zoologists, botanists, and geographers for often writing on the problem without having consulted Wallace himself, or the manifold literature extant on this subject, and still advocating a frontier which specialists have long since abandoned. He shows in detail how Wallace himself has altered his opinion from 1860 to 1863, 1869, 1876, and 1880, and what Weber's merits are in promoting knowledge on this question.

On going over these different opinions on Wallace's line it will be seen that they are fairly equally divided, though they must be weighed and not counted, many writers on the general subject not plunging deeply into the problem, but uncritically following the authority of this eminent naturalist. One must also take into account that errors, when once they have crept into books, disappear from them with great difficulty. On the other hand also, some

specialists of the highest standing acquiesce in the line, partly disregarding the circumstance that Wallace himself has to a certain degree altered his views; whereas others of the same rank encounter insuperable obstacles in adopting such a frontier between the Oriental and Australian Regions. There can be no doubt that in our present state of knowledge it is premature to define the problem for solution, however interesting and suggestive it may be, and that it is, therefore, waste of time to speculate on it with the help of an up-and-down system for the islands and continents, just as required. It is characteristic of an inadequate hypothesis that it is always in need of a new one which should sustain it, and as geology and palaeontology are as yet powerless to guide us, we must restrict ourselves to zoology, though we know that here also our knowledge is defective in a high degree. Let us see, however, what the ornithology of Celebes in its present state teaches, and whether our results agree at least with those arrived at by others.

What are the characteristic elements of the Celebesian Avifauna and where did they originate? This is the only question we put, and which we will try to answer — always bearing in mind that our ornithological knowledge of Celebes, especially of the centre and high mountains, is imperfect —, leaving all further speculations to the naturalist of the future.

The following table of the Geographical Distribution of the species treated of in this book will facilitate the answer to our question. It will be observed that the Celebesian Area is flanked to the left by the Nearctic, Ethiopian, Palaearctic and Oriental Regions, to the right by the Australian and Neotropical Regions, the generally adopted Sclaterian division having been accepted for convenience's sake, though we are aware that that of Prof. Newton (D. B. 1893, p. 315 *et seq.*) is an improvement upon it. (His main divisions are the New Zealand, Australian, Neotropical, Holarctic, Ethiopian and Indian Regions; uniting under the Holarctic the Nearctic and Palaearctic, and separating the former Australasian Region into an Australian and a New Zealand Region.) The affinities of the Celebesian Avifauna make it preferable to break up the Oriental Region into several parts, inserting between them Japan — a section of the Palaearctic Region, as follows: Indian Province, Chinese Province, Japan, the Malay Peninsula, Sumatra, Java, and Borneo. For similar reasons we have divided the Australian Region into Papuasia, Australia, Polynesia, and New Zealand. As to the middle parts of the East Indian Archipelago we advocate, as will be seen later on, the recognition of a broad Transition-Zone, comprising four areas — a Philippine, a Celebesian, a Lesser Sundan, and a Moluccan, — although the three first display a preponderance of Asiatic elements, while the Moluccas correspond naturally to their geographical position between Sula and Papuasia.

GEOGRAPHICAL DISTRIBUTION OF THE

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
1	Spilornis rufipectus J. Gd. (typical) . .	2	—	—	—	—	—	—	—	—	—	—	—	—
	— rufipectus sulaensis (Schl.) . . .	4	—	—	—	—	—	—	—	—	—	—	—	—
	— rufipectus<sulaensis	5	—	—	—	—	—	—	—	—	—	—	—	—
2	Circus assimilis Jard. Selby	7	—	—	—	—	—	—	—	—	—	—	—	—
3	Astur griseiceps Schl..	9	—	—	—	—	—	—	—	—	—	—	—	—
4	Astur trivirgatus (Temm.) (typical) . .	11	—	—	—	*	*	—	—	*	*	*	*	—
	— trivirgatus rufitinctus (Mc Clell.)	12	—	—	—	*	—	—	*	—	—	—	—	—
5	? Astur tenuirostris Brügg.	13	—	—	—	—	—	—	—	—	—	—	—	—
6	Urospizias torquatus (Temm.).	15	—	—	—	—	—	—	—	—	*?	—	—	*
7	Tachyspizias soloensis (Horsf.)	17	—	—	—	*	*	—	*	*	*	*	*	—
8	Spilospizias trinotatus (Bp.) (typical) . .	21	—	—	—	—	—	—	—	—	—	—	—	—
	— trinotatus haesitandus Hart. . .	23	—	—	—	—	—	—	—	—	—	—	—	—
9	Accipiter rhodogaster (Schl.).	25	—	—	—	—	—	—	—	—	—	—	—	—
10	Accipiter sulaensis (Schl.)	26	—	—	—	—	—	—	—	—	—	—	—	—
11	Accipiter virgatus (Temm.) (typical). .	27	—	—	—	*	—	—	*	*	*	—	—	—
	— virgatus affinis (Hdgs.)	28	—	—	—	*	*	—	—	—	—	—	—	—
	— virgatus manilensis (Meyen) . .	28	—	—	—	—	—	—	—	—	—	—	*	—
	— virgatus gularis (Temm. Schl.).	28	—	—	*	—	*	*	*	*	*	*	*	*
	— virgatus rufotibialis (Sharpe). .	29	—	—	—	—	—	—	—	—	—	*	—	—
12	Spizaetus lanceolatus Temm. Schl.. .	32	—	—	—	—	—	—	—	—	—	—	—	—
13	Lophotriorchis kieneri (G. Sparre) . .	35	—	—	—	*	—	—	*	*	*	*	*	*
14	Ictinaetus malayensis (Reinw.)	38	—	—	—	*	—	—	*	*	*	*	—	—
15	Haliaetus leucogaster (Gm.)	40	—	—	—	*	*	—	*	*	*	*	*	*
16	Polioaetus humilis (Müll. Schl.) (typical)	43	—	—	—	*	—	—	*	—	—	*	—	—
	— humilis major n. subsp.	44	—	—	—	*	—	—	—	—	—	—	—	—
	— humilis—major	44	—	—	—	*	—	—	—	—	—	—	—	—
17	Butastur indicus (Gm.)	45	—	—	*	*	*	*	*	—	*	*	*	—
18	Butastur liventer (Temm.)	49	—	—	—	*	*	—	—	—	*	*?	—	*
19	Haliastur indus (Bodd.)	51	—	—	—	*	—	—	*	*	*	*	*	*
20	Milvus migrans (Bodd.) (typical) . . .	60	—	*	*	*	—	—	—	—	—	—	—	—
	— migrans melanotis (Temm. Schl.)	60	—	—	*	*	—	*	—	—	—	*	—	—
	— migrans govinda (Sykes). . . .	60	—	—	—	*	—	—	—	—	—	—	—	—
	— — affinis (J. Gd.) & m.—affinis.	60	—	—	—	*	*	—	*	*	—	—	—	*
21	Elanus hypoleucus J. Gd.	62	—	—	—	—	—	—	—	*	*	*	*	—
22	Pernis celebensis (Wall.).	65	—	—	—	—	—	—	—	—	—	—	—	—
23	Pernis sp.	72	—	—	—	—	—	—	—	—	—	—	—	—
24	Baza celebensis Schl.	73	—	—	—	—	—	—	—	—	—	—	—	—
25	Baza reinwardti Müll. Schl.	75	—	—	—	—	—	—	—	—	—	—	—	*
26	Tinnunculus moluccensis orient. n. subsp.	79	—	—	—	—	—	—	—	—	—	—	—	—
	— moluccensis occidentalis M. & Wg.	79	—	—	—	—	—	—	—	—	*	*	—	*
	— molucc. orientalis—occidentalis .	79	—	—	—	—	—	—	—	—	—	—	—	—
27	Falco severus papuanus M. & Wg. . . .	84	—	—	—	—	—	—	—	—	—	—	—	—

SPECIES OF THE CELEBESIAN AREA.

Celebesian Area																		
		Celebes																
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
—	*?	*	—	*	*	*	*	*	*	—	—	*	—	—	—	—	—	—	Spilornis rufipectus (typ.)
—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	— rufipectus sulaensis.
—	—	*	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	— — <sulaensis.
—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	*	—	—	—	Circus assimilis.
—	—	*	*	—	—	—	*	—	—	—	—	*	*	*	—	—	—	—	Astur griseiceps.
—	—	*	*	—	—	—	*	—	—	—	—	*	—	—	—	—	—	—	Astur trivirgatus.
—	—	*	*	—	—	—	*	—	—	—	—	*	—	—	—	—	—	—	— — rufitinctus.
—	—	*?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	? Astur tenuirostris.
—	—	*	—	—	—	—	*	—	—	*	—	*	*	*	*	—	—	—	Urospizias torquatus.
—	—	*	—	—	—	—	*	—	—	—	—	*	—	—	—	—	—	—	Tachyspizias soloensis.
—	—	*	—	—	—	—	*	—	—	—	*	—	—	—	—	—	—	—	Spilospizias trinotat. (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	— — haesitandus.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Accipiter rhodogaster.
—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	—	Accipiter sulaensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Accipiter virgatus (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— virgatus affinis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— virgatus manilensis.
—	—	*	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	— virgatus gularis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— virgatus rufotibialis.
—	—	*	—	—	—	*	*	—	—	—	—	*	—	—	—	—	—	—	Spizaetus lanceolatus.
—	—	*	—	—	—	—	—	—	—	—	—	—	*?	—	—	—	—	—	Lophotriorchis kieneri.
—	—	*	—	—	—	—	*	—	—	—	—	*?	*	—	—	—	—	—	Ictinaetus malayensis.
—	—	*	—	*	—	—	*	—	*	—	*	—	*	*	*	*?	*?	—	Haliaetus leucogaster.
—	—	—	—	—	—	—	*	—	—	—	*	—	—	—	—	—	—	—	Polioaetus humilis (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— humilis major n. subsp.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— humilis—major.
*	*	*	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	Butastur indicus.
—	—	—	—	—	—	*	*	—	—	—	—	—	*?	—	—	—	—	—	Butastur liventer.
*	*	*	—	—	*	—	*	—	—	—	*	*	*	*	*	—	—	—	Haliastur indus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Milvus migrans (typical).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— migrans melanotis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— migrans govinda.
—	—	*	—	—	—	—	*	—	—	—	—	—	—	—	*	—	—	—	— migrans affinis, etc.
—	—	*	—	—	—	*	*	—	—	*	—	—	—	—	—	—	—	—	Elanus hypoleucus.
—	—	*	—	—	—	—	*	—	—	*	—	—	—	—	—	—	—	—	Pernis celebensis.
—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	Pernis sp.
—	—	*	—	—	—	*	*	—	—	—	*	*	—	—	—	—	—	—	Baza celebensis.
—	—	—	—	—	—	—	—	—	—	*	—	—	*	*	—	—	—	—	Baza reinwardti.
—	—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	Tinnunculus mol. orient.
—	—	*	—	—	—	—	*	—	—	*	—	—	—	*?	—	—	—	—	— moluccensis occident.
—	—	—	—	—	—	—	—	—	—	—	*	—	*	—	—	—	—	—	— — orient.—occident.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	Falco severus papuanus.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
27	Falco severus indicus n. subsp.	84	—	—	—	*	—	—	—	—	—	—	—	—
	— severus papuanus—indicus	84	—	—	—	*	—	—	*	—	*	*	*	—
28	Falco peregrinus (Gerini) (typical)	85	*?	*	*	*	*?	—	—	*	*	*	*	*
	— peregrinus melanogenys (J. Gd.)	86	—	—	—	—	—	—	—	—	—	*	—	—
	— peregrinus ernesti (Sharpe)	86	—	—	—	—	—	—	—	—	—	—	—	—
	— peregrinus anatum (Bp)	87	*	—	*?	—	—	—	—	—	—	—	—	—
	— peregrinus pealei Ridgw.	87	*	—	—	—	—	—	—	—	—	—	—	—
29	Pandion haliaetus (L.) (typical)	89	—	*	*	*	*	—	—	—	*	*	*	—
	— haliaetus leucocephalus (J. Gd.)	89	—	—	—	—	—	—	—	—	—	—	—	—
	— haliaetus carolinensis (Gm.)	90	*	—	—	—	—	—	—	—	—	—	—	—
30	Ninox ochracea (Schl.)	94	—	—	—	—	—	—	—	—	—	—	—	—
31	Ninox scutulata (Raffl.) (typical)	95	—	—	—	*	—	—	*	*	*	*	—	—
	— scutulata lugubris (Tickell)	95	—	—	—	*	—	—	—	—	—	—	—	—
	— scutulata affinis (Tytler)	95	—	—	—	*	—	—	—	—	—	—	—	—
	— scutulata japonica (Temm. Schl.)	95	—	—	*	—	*	*	—	—	—	*	*	*
32	Cephaloptynx punctulata (Q. G.)	100	—	—	—	—	—	—	—	—	—	—	—	—
33	Scops manadensis (Q. G.) (typical)	103	—	—	—	—	—	—	—	—	—	—	—	—
	— manadensis albiventris (Sharpe)	105	—	—	—	—	—	—	—	—	—	—	—	*
	— manadensis rutilus (Pucher.)	105	—	*	—	—	—	—	—	—	—	—	—	—
	— manadensis capnodes (Gurney)	105	—	*	—	—	—	—	—	—	—	—	—	—
	— manadensis magicus (S. Müll.)	105	—	—	—	—	—	—	—	—	—	—	—	—
	— manadensis leucospilus (Gray)	106	—	—	—	—	—	—	—	—	—	—	—	—
	? — manadensis morotensis (Sharpe)	106	—	—	—	—	—	—	—	—	—	—	—	—
	— manadensis brookii (Sharpe)	107	—	—	—	—	—	—	—	—	—	*	—	—
	— manadensis sibutuensis (Sharpe)	107	—	—	—	—	—	—	—	—	—	—	*	—
34	Strix flammea rosenbergi (Schl.)	109	—	—	—	—	—	—	—	—	—	—	—	—
	— flammea L. (typical) [1]	111												
35	Strix inexpectata Schl.	112	—	—	—	—	—	—	—	—	—	—	—	—
36	Strix candida Tick.	112	—	—	—	*	*	—	—	—	—	—	*	—
37	Eos histrio (St. Müll.) (typical)	115	—	—	—	—	—	—	—	—	—	—	—	—
	— histrio talautensis M. & Wg.	117	—	—	—	—	—	—	—	—	—	—	—	—
	— histrio challengeri (Salvad.)	118	—	—	—	—	—	—	—	—	—	—	—	—
38	Trichoglossus ornatus (L.)	120	—	—	—	—	—	—	—	—	—	—	—	—
39	Trichoglossus forsteni Bp. (typical)	123	—	—	—	—	—	—	—	—	—	—	—	*
	— forsteni djampeanus Hart.	124	—	—	—	—	—	—	—	—	—	—	—	—
40	Trichoglossus meyeri Tweedd. (typical)	124	—	—	—	—	—	—	—	—	—	—	—	—
	— meyeri bonthainensis (A. B. M.)	125	—	—	—	—	—	—	—	—	—	—	—	—
41	Trichoglossus flavoviridis Wall.	127	—	—	—	—	—	—	—	—	—	—	—	—
42	Cacatua sulphurea (Gm.) (typical)	128	—	—	—	—	—	—	—	—	—	—	—	—
	— sulphurea djampeana Hart.	130	—	—	—	—	—	—	—	—	—	—	—	—
	— sulphurea parvula (Bp.)	130	—	—	—	—	—	—	—	—	—	—	—	*
43	Prioniturus platurus (Vieill.)	133	—	—	—	—	—	—	—	—	—	—	—	—
44	Prioniturus flavicans Cass.	138	—	—	—	—	—	—	—	—	—	—	—	—
45	Tanygnathus muelleri (Müll. Schl.) (typ.)	140	—	—	—	—	—	—	—	—	—	—	—	—

[1] Distribution not clearly defined.

Celebesian Area												Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
Talaut Islands	Sangi Islands	Celebes: North Peninsula	Celebes: West Celebes	Celebes: East Peninsula	Celebes: Togian Islands	Celebes: Central Celebes	Celebes: South Peninsula	Celebes: S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands							
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Falco severus indicus.
—	—	—	—	—	—	—	—	—	—	—	—	—	✶	—	—	—	—	— — papuan.—indicus.
—	✶	✶	—	—	—	—	—	—	—	—	—	—	—	✶	—	—	—	Falco peregrinus (typ.).
—	✶	✶	—	—	—	—	✶	—	—	✶	—	✶	✶	✶	✶	—	—	— — melanogenys.
—	✶	✶	—	✶	—	—	—	—	—	—	—	—	—	—	✶	—	—	— — ernesti.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	✶	— — anatum.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — pealei.
—	✶	✶	—	—	—	—	✶	—	—	✶	—	✶	✶	✶	✶	✶	—	Pandion haliaetus (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	✶	— — leucocephalus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — carolinensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Ninox ochracea.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Ninox scutulata (typical).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — lugubris.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — affinis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — japonica.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Cephaloptynx punctulata.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Scops manadensis (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — albiventris.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — rutilus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — capnodes.
—	—	—	—	—	—	—	—	—	—	—	—	✶	—	—	—	—	—	— — magicus.
—	—	—	—	—	—	—	—	—	—	—	—	✶	—	—	—	—	—	— — leucospilus.
—	—	—	—	—	—	—	—	—	—	—	—	✶	—	—	—	—	—	?— — morotensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — brookii.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — sibutuensis.
—	✶	✶	—	—	—	—	✶	—	—	—	—	—	—	—	—	—	—	Strix flammea rosenbergi.
—	—	—	—	—	—	—	—	—	—	✶	—	—						— flammea (typical)[1].
—	—	✶	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Strix inexpectata.
—	—	—	—	—	—	✶	—	—	—	—	—	—	—	—	✶	✶	—	Strix candida.
—	✶	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Eos histrio (typical).
✶	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— histrio talautensis.
✶[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— histrio challengeri.
—	—	✶	✶	✶	✶	—	✶	✶	—	—	✶	—	—	—	—	—	—	Trichoglossus ornatus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Trich. forsteni (typical).
—	—	—	—	—	—	—	—	—	—	✶	—	—	—	—	—	—	—	— forsteni djampeanus.
—	—	✶	—	—	—	✶	—	—	—	—	—	—	—	—	—	—	—	Trich. meyeri (typical).
—	—	—	—	—	—	—	✶	—	—	—	—	—	—	—	—	—	—	— meyeri bonthainensis.
—	—	—	—	—	—	—	—	—	—	—	—	✶	—	—	—	—	—	Trich. flavoviridis.
—	—	✶	✶	—	—	✶	✶	✶	—	—	—	—	—	—	—	—	—	Cacatua sulphurea (typ.).
—	—	—	—	—	—	—	—	—	—	✶	—	—	—	—	—	—	—	— sulphurea djampeana
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— sulphurea parvula.
✶	✶	✶	—	—	✶	—	✶	✶	—	—	✶	—	✶?	—	—	—	—	Prioniturus platurus.
—	✶?	✶	—	—	✶	—	—	—	—	—	—	—	—	—	—	—	—	Prioniturus flavicans.
—	—	✶	—	✶	✶	✶	✶	✶	—	—	✶	✶	—	—	—	—	—	Tanygnath. muelleri (typ.).

[2] Lit. Nanusa Islands.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
45	Tanygnathus muelleri sangirensis M.&Wg.	142	—	—	—	—	—	—	—	—	—	—	—	—
	— muelleri—sangirensis	142	—	—	—	—	—	—	—	—	—	—	—	—
46	? Tanygnathus luconensis (L.).	144	—	—	—	—	—	—	—	—	—	—	*	—
47	Tanygnathus talautensis M. & Wg. . .	145	—	—	—	—	—	—	—	—	—	—	—	—
48	Tanygnath. megalorhynchus (Bodd.) (typ.)	146	—	—	—	—	—	—	—	—	—	—	—	—
	— megalorhynchus sumbensis (Meyer)	148	—	—	—	—	—	—	—	—	—	—	—	*
	— megalorhynchus — sumbensis . .	148	—	—	—	—	—	—	—	—	—	—	—	—
49	Loriculus exilis Schl.	149	—	—	—	—	—	—	—	—	—	—	—	—
50	Loriculus catamene Schl.	151	—	—	—	—	—	—	—	—	—	—	—	—
51	Loriculus sclateri Wall. (typical) . . .	153	—	—	—	—	—	—	—	—	—	—	—	—
	— sclateri ruber M. & Wg.	154	—	—	—	—	—	—	—	—	—	—	—	—
52	Loriculus quadricolor Tweedd.	157	—	—	—	—	—	—	—	—	—	—	—	—
53	Loriculus stigmatus (Müll. Schl.) . .	158	—	—	—	—	—	—	—	—	—	—	—	—
54	Aprosmictus sulaensis (Rchw.)	170	—	—	—	—	—	—	—	—	—	—	—	—
55	Iyngipicus temmincki (Malh.)	173	—	—	—	—	—	—	—	—	—	—	—	—
56	Microstictus fulvus (Q. G.)	175	—	—	—	—	—	—	—	—	—	—	—	—
57	Microstictus wallacei (Tweedd.) . . .	179	—	—	—	—	—	—	—	—	—	—	—	—
58	Hierococcyx crassirostris (Tweedd.) . .	182	—	—	—	—	—	—	—	—	—	—	—	—
59	Hierococcyx sparverioides (Vig.). . . .	184	—	—	*	*	*	—	*	—	*	*	*	—
60	Hierococcyx fugax (Horsf.)	185	—	—	*	—	*	*	*	*	*	*	*	—
61	Cuculus canorus (L.) (typical)	187	—	*	*	*	—	—	—	—	—	—	—	—
	— canorus canoroides (S. Müll.) .	188	—	—	*?	*	*	*	*	—	*	*	*	*
62	? Cuculus saturatus Hdgs..	191	—	—	*?	*	*	*?	—	*?	*?	*	*?	*?
63	Chrysococcyx malayanus (Raffl.) . . .	194	—	—	—	—	—	—	*	*	—	*	*	*
64	Chrysococcyx basalis (Horsf.)	195	—	—	—	—	—	—	*	—	*	—	—	*
65	Cacomantis virescens (Brügg.)	196	—	—	—	—	—	—	—	—	—	—	—	—
66	Cacomantis merulinus (Scop.)	199	—	—	—	*	*	—	*	—	*	*	*	*
67	Coccystes coromandus (L.)	201	—	—	—	*	*	—	*	*	*	*	*	—
68	Surniculus musschenbroeki A. B. M. . .	203	—	—	—	—	—	—	—	—	—	—	—	—
69	Eudynamis melanorhyncha S. Müll. . .	205	—	—	—	—	—	—	—	—	—	—	—	—
70	Eudynamis mindanensis (L.) (typical). .	210	—	—	—	—	—	—	—	—	—	—	*	—
	— mindanensis sangirensis (W. Blas.)	211	—	—	—	—	—	—	—	—	—	—	—	—
71	Centrococcyx bengalensis (Gm.)	213	—	—	—	*	*	—	*	*	*	*	*	*
72	Pyrrhocentor celebensis (Q. G.) (typical)	221	—	—	—	—	—	—	—	—	—	—	—	—
	— celebensis rufescens M. & Wg.) .	223	—	—	—	—	—	—	—	—	—	—	—	—
73	Phoenicophaes calorhynch. (Temm.) (typ.)	226	—	—	—	—	—	—	—	—	—	—	—	—
	— calorhynchus meridionalis M. & Wg.	227	—	—	—	—	—	—	—	—	—	—	—	—
74	Scythrops novaehollandiae Lath. . . .	231	—	—	—	—	—	—	—	—	—	—	—	*
75	Rhabdotorrhinus exaratus (Temm.) . .	235	—	—	—	—	—	—	—	—	—	—	—	—
76	Cranorrhinus cassidix (Temm.	239	—	—	—	—	—	—	—	—	—	—	—	—
77	Merops ornatus Lath..	248	—	—	—	—	—	—	—	—	*?	*?	—	*
78	Merops philippinus L.	253	—	—	—	*	*	—	*	*	*	*	*	*
79	Meropogon forsteni Bp.	257	—	—	—	—	—	—	—	—	—	—	—	—
80	Alcedo ispida L.	262	—	*	*	*	*	*	*	—	*	*	*	*

Celebesian Area																				
		Celebes																		
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Tanygn. muell. sangirensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— muelleri—sangirensis.
—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	?Tanygnath. luconensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Tanygnath. talautensis.
—	—	✱	—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	T. megalorhynchus (typ.).
—	—	✱	—	—	—	—	—	—	—	—	—	—	✱	✱	—	—	—	—	— — sumbensis.
—	—	✱	—	—	—	—	—	—	—	✱	—	—	—	—	—	—	—	—	— megalorh.—sumb.
—	—	✱?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Loriculus exilis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Loriculus catamene.
—	—	—	—	—	—	—	—	—	—	—	—	✱	—	—	—	—	—	—	Loriculus sclateri.
—	—	—	—	—	—	—	—	—	—	—	✱	—	—	—	—	—	—	—	— sclateri ruber.
—	—	—	—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	Loriculus quadricolor.
—	—	—	—	—	—	—	—	—	—	—	✱	—	—	—	—	—	—	—	Loriculus stigmatus.
—	—	—	—	—	—	—	—	—	—	—	✱	—	—	—	—	—	—	—	Aprosmictus sulaensis.
—	—	✱	—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	Iyngipicus temmincki.
—	—	—	✱	✱	—	✱	✱	✱?	—	—	—	—	—	—	—	—	—	—	Microstictus wallacei.
—	—	✱	—	—	—	✱	✱	—	—	—	—	—	—	—	—	—	—	—	Hierococcyx crassirostris.
—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Hierococc. sparverioides.
—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Hierococc. fugax.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Cuculus canorus (typ.).
✱	✱	✱	—	—	—	—	✱	—	✱	✱	—	✱	✱	✱	✱	✱	—	—	— — canorus canoroides.
—	—	✱?	—	—	—	—	✱?	—	—	—	—	—	✱?	✱?	✱?	✱?	—	—	? Cuculus saturatus.
—	—	—	—	—	—	✱	✱	—	—	—	—	—	—	✱	✱	—	—	—	Chrysococcyx malayanus.
—	—	—	—	—	—	—	✱	—	—	—	—	—	—	✱	✱	—	—	—	Chrysococcyx basalis.
—	—	✱	✱	✱	—	✱	✱	—	—	—	✱	—	—	—	—	—	—	—	Cacomantis virescens.
—	—	—	✱	—	✱?	—	✱	—	—	—	—	—	—	—	—	—	—	—	Cacomantis merulinus.
—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Coccystes coromandus.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	—	—	—	—	—	Surnicul. musschenbroeki.
—	—	✱	✱	✱	✱	—	✱	—	—	—	✱	✱	—	—	—	—	—	—	Eudynam. melanorhyncha.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Eud. mindanensis (typical).
✱	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — sangirensis.
✱	✱	✱	—	✱	—	✱	✱	✱	—	✱	—	—	✱	—	—	—	—	—	Centrococcyx bengalensis
—	—	✱	—	—	✱	—	✱?	—	—	—	—	—	—	—	—	—	—	—	Pyrrhocentor celeb. (typ.).
—	—	—	✱	✱	—	—	✱	—	—	—	—	—	—	—	—	—	—	—	— celebensis rufescens.
—	—	✱	—	✱	✱	—	—	✱	—	—	—	—	—	—	—	—	—	—	Phoenicoph. calorh. (typ.).
—	—	—	✱	—	—	✱	✱	—	—	—	—	—	—	—	—	—	—	—	— — meridionalis.
✱	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	—	—	—	Scythrops novaeholland.
—	—	✱	✱	✱	—	✱	✱	—	—	—	—	—	—	—	—	—	—	—	Rhabdotorrhinus exarat.
—	—	✱	—	✱	✱	✱	✱	—	—	—	—	—	—	—	—	—	—	—	Cranorrhinus cassidix.
✱	✱	✱	✱	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	—	—	Merops ornatus.
—	—	✱	—	—	—	✱	✱	—	—	—	—	—	—	—	—	—	—	—	Merops philippinus.
—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Meropogon forsteni.
✱	✱	✱	—	—	—	—	—	—	✱	—	—	—	✱	—	—	—	—	—	Alcedo ispida.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
81	Alcedo moluccana (Less.)	264	—	—	—	—	—	—	—	—	—	—	—	—
82	Alcedo meninting Horsf.	266	—	—	—	*	*	—	*	*	*	*	*	*
83	Pelargopsis melanorhyncha (Temm.)	269	—	—	—	—	—	—	—	—	—	—	—	—
84	Pelargopsis dichrorhyncha M. & Wg.	271	—	—	—	—	—	—	—	—	—	—	—	—
85	Ceyx wallacei Sharpe	272	—	—	—	—	—	—	—	—	—	—	—	—
86	Ceycopsis fallax (Schl.)	275	—	—	—	—	—	—	—	—	—	—	—	—
87	Ceycopsis sangirensis M. & Wg.	278	—	—	—	—	—	—	—	—	—	—	—	—
88	Halcyon coromanda rufa (Wall.)	280	—	—	—	—	—	—	—	—	—	—	—	—
89	Halcyon pileata (Bodd.)	283	—	—	*	*	*	*	*	**	*	**	*	*
90	Halcyon sancta Vig. Horsf.	287	—	—	—	—	—	—	—	—	—	—	—	—
91	Halcyon chloris (Bodd.) (typical) [1]	292												
92	Monachalcyon monachus (Bp.) (typical)	297	—	—	—	—	—	—	—	—	—	—	—	—
	— monachus intermedius Hart.	298	—	—	—	—	—	—	—	—	—	—	—	—
93	Monachalcyon capucinus M. & Wg.	299	—	—	—	—	—	—	—	—	—	—	—	—
94	Monachalcyon princeps Rchb.	300	—	—	—	—	—	—	—	—	—	—	—	—
95	Cittura cyanotis (Temm.)	303	—	—	—	—	—	—	—	—	—	—	—	—
96	Cittura sangirensis Sharpe	305	—	—	—	—	—	—	—	—	—	—	—	—
97	Coracias temmincki (Vieill.)	309	—	—	—	—	—	—	—	—	—	—	—	—
98	Eurystomus orientalis (L.)	312	—	—	*	*	*	—	*	*	*	*	—	*
99	Caprimulgus macrurus Horsf. (typical)	317	—	—	—	—	—	—	*	*	*	*	*	*
	— macrurus albonotatus (Tick.)	318	—	—	—	*	—	—	—	—	—	—	—	—
	— macrurus—albonotatus	318	—	—	—	*	*	—	—	—	—	—	—	—
100	Caprimulgus celebensis Grant	320	—	—	—	—	—	—	—	—	—	—	—	—
101	Caprimulgus affinis Horsf.	321	—	—	—	—	—	—	—	*	*	*	—	*
102	Lyncornis macropterus Bp.	322	—	—	—	—	—	—	—	—	—	—	—	—
103	Cypselus pacificus (Lath.)	327	—	—	*	*	*	*	*	—	—	—	—	—
104	Chaetura celebensis (Scl.)	329	—	—	—	—	—	—	—	—	—	—	*	—
105	Collocalia fuciphaga (Thunb.)	331	—	—	—	*	*	—	*	*	*.	*	—	*
106	Collocalia esculenta (L.)	334	—	—	—	—	—	—	—	—	—	—	—	—
107	Collocalia francica (Gm.)	335	—	*	—	*	—	—	*	—	—	—	*	—
108	Macropteryx wallacei (J. Gd.)	336	—	—	—	—	—	—	—	—	—	—	—	—
109	Pitta celebensis Müll. Schl.	340	—	—	—	—	—	—	—	—	—	—	—	—
110	Pitta palliceps Brügg.	344	—	—	—	—	—	—	—	—	—	—	—	—
111	Pitta caeruleitorques Salvad.	345	—	—	—	—	—	—	—	—	—	—	—	—
112	Pitta inspeculata M. & Wg.	346	—	—	—	—	—	—	—	—	—	—	—	—
113	Pitta forsteni Bp.	350	—	—	—	—	—	—	—	—	—	—	—	—
114	Pitta sangirana (Schl.)	351	—	—	—	—	—	—	—	—	—?	—	—?	—
115	Pitta cyanoptera Temm.	352	—	—	*	*	*	—	*	*	*	*	*	—
116	Pitta irena Temm.	354	—	—	—	—	—	—	—	—	—	—	—	*
117	Pitta virginalis Hart.	355	—	—	—	—	—	—	—	—	—	—	—	—
118	Hirundo rustica L. (races) [1]	357												
119	Hirundo javanica Sparrm.	358	—	—	—	*	—	—	*	*	*	*	*	*
120	Muscicapa griseosticta (Swinh.)	363	—	—	—	—	*	—	—	—	—	—	*	—

[1] Distribution of races not capable of exact definition.

Celebesian Area																		
		Celebes																
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
—	*	*	*	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	Alcedo moluccana.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Alcedo meninting.
—	—	*	—	*	—	—	*	*	—	—	—	—	—	—	—	—	—	—	Pelargops. melanorhyncha
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Pelargops. dichrorhyncha.
—	—	*	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Ceyx wallacei.
*	*	*	—	—	—	—	*	—	—	*	*	*	*	*	*	—	*	—	Ceycopsis fallax.
—	—	*	—	—	—	—	—	—	—	*	—	—	*	*	*	—	—	—	Ceycopsis sangirensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Halcyon coromanda rufa.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Halcyon pileata.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Halcyon sancta.
—	—	*	*	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	Halcyon chloris (typ.)[1]).
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Monachalc. monach. (typ.).
—	—	*	—	*	—	—	*	*	—	—	—	—	—	—	—	—	—	—	— — intermedius.
—	—	*	—	—	—	—	—	—	*	*	—	—	*	*	*	—	—	—	Monachalcyon capucinus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Monachalcyon princeps.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Cittura cyanotis.
—	—	—	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Cittura sangirensis.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Coracias temmincki.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	Caprimulg. macrurus (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — albonotatus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— macrurus—albonotat.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Caprimulgus celebensis.
—	—	—	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Caprimulgus affinis.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Lyncornis macropterus.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	Cypselus pacificus.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Chaetura celebensis.
—	—	—	—	—	—	—	*	—	—	—	—	—	*	*	—	*	—	—	Collocalia fuciphaga.
—	—	*	—	—	—	—	*	—	—	*	*	—	*	*	*	—	—	—	Collocalia esculenta.
—	—	—	—	—	—	—	—	—	—	*	—	—	*	*	*	*	—	—	Collocalia francica.
—	—	*	—	*	*	*	*	—	*	—	*	*	—	—	—	—	—	—	Macropteryx wallacei.
—	—	*	*	*	*	—	*	—	—	—	—	—	—	—	—	—	—	—	Pitta celebensis.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Pitta palliceps.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Pitta caeruleitorques.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Pitta inspeculata.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Pitta forsteni.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Pitta sangirana.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Pitta cyanoptera.
—	*	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	Pitta irena.
—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	Pitta virginalis.
—	*	*	—	—	*	—	*	—	—	—	—	—							Hirundo rustica L. (races)[1])
*	*	*	—	*	*	—	*	—	—	—	—	*	*	*	*	—	—	—	Hirundo javanica.
*	—	*	—	—	—	—	*	—	—	—	—	—	*	*	—	—	—	—	Muscicapa griseosticta.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
121	Muscicapula westermanni Sharpe. . .	365	—	—	—	*	—	—	—	—	*	*	*	*
122	Muscicapula hyperythra (Blyth) . . .	366	—	—	—	*	—	—	—	—	*	*	—	—
123	Siphia banyumas (Horsf.)	368	—	—	—	—	—	—	*?	*?	*	*?	*?	—
124	Siphia djampeana Hart.	371	—	—	—	—	—	—	—	—	—	—	—	—
125	Siphia kalaoensis Hart.	371	—	—	—	—	—	—	—	—	—	—	—	—
126	Siphia rufigula (Wall.).	372	—	—	—	—	—	—	—	—	—	—	—	—
127	Siphia bonthaina Hart.	373	—	—	—	—	—	—	—	—	—	—	—	—
128	Stoparola septentrionalis Bütt. . . .	374	—	—	—	—	—	—	—	—	—	—	—	—
129	Stoparola meridionalis Bütt.	375	—	—	—	—	—	—	—	—	—	—	—	—
130	Hypothymis puella (Wall.)	376	—	—	—	—	—	—	—	—	—	—	—	—
131	Hypothymis rowleyi (A.B.M.)	378	—	—	—	—	—	—	—	—	—	—	—	—
132	Rhipidura celebensis Bütt.	379	—	—	—	—	—	—	—	—	—	—	—	—
133	Rhipidura teijsmanni Bütt.	380	—	—	—	—	—	—	—	—	—	—	—	—
134	Zeocephus talautensis M.&Wg. . . .	382	—	—	—	—	—	—	—	—	—	—	—	—
135	Monarcha commutatus Brügg.	383	—	—	—	—	—	—	—	—	—	—	—	—
136	Monarcha inornatus (Garn.)	384	—	—	—	—	—	—	—	—	—	—	—	*
137	Monarcha everetti Hart.	385	—	—	—	—	—	—	—	—	—	—	—	—
138	Myiagra rufigula Wall.	386	—	—	—	—	—	—	—	—	—	—	—	*
139	Culicicapa helianthea (Wall.)	387	—	—	—	—	—	—	—	—	—	—	*	—
140	Gerygone flaveola Cab.	388	—	—	—	—	—	—	—	—	—	—	—	—
141	Pratincola caprata (L.).	390	—	—	*	*	—	—	—	—	*	*?	*	*
142	Pachycephala sulfuriventer (Tweedd.) .	394	—	—	—	—	—	—	—	—	—	—	—	—
143	Pachycephala meridionalis Bütt. . . .	396	—	—	—	—	—	—	—	—	—	—	—	—
144	Pachycephala teijsmanni Bütt.	396	—	—	—	—	—	—	—	—	—	—	—	—
145	Pachycephala orpheus Jard.	397	—	—	—	—	—	—	—	—	—	—	—	*
146	Pachycephala griseonota G.R.Gray. .	398	—	—	—	—	—	—	—	—	—	—	—	—
147	Pachycephala clio Wall.	399	—	—	—	—	—	—	—	—	—	—	—	—
148	Pachycephala everetti Hart.	400	—	—	—	—	—	—	—	—	—	—	—	—
149	Pachycephala bonthaina M.&Wg. . . .	401	—	—	—	—	—	—	—	—	—	—	—	—
150	Pachycephala bonensis M.&Wg. . . .	401	—	—	—	—	—	—	—	—	—	—	—	—
151	Colluricincla sangirensis (Oust.). . . .	402	—	—	—	—	—	—	—	—	—	—	—	—
152	Lanius tigrinus Drapiez	403	—	—	*	*	*	*	*	*	*	*	*	—
153	Lanius lucionensis L.	406	—	—	*	*	*	—	*	*	—	*	*	*
154	Graucalus bicolor (Temm.).	411	—	—	—	—	—	—	—	—	—	—	—	—
155	Graucalus leucopygius Bp.	413	—	—	—	—	—	—	—	—	—	—	—	—
156	Graucalus temmincki (S. Müll.). . . .	415	—	—	—	—	—	—	—	—	—	—	—	—
157	Graucalus schistaceus (Sharpe). . . .	416	—	—	—	—	—	—	—	—	—	—	—	—
158	Graucalus melanops (Lath.)	417	—	—	—	—	—	—	—	—	—	—	—	*
159	Edoliisoma morio (S. Müll.) (typical) .	419	—	—	—	—	—	—	—	—	—	—	—	—
	— morio septentrionalis M.&Wg. .	420	—	—	—	—	—	—	—	—	—	—	—	—
	— morio—septentrionalis M.&Wg. .	421	—	—	—	—	—	—	—	—	—	—	—	—
160	Edoliisoma salvadorii Sharpe . . .	422	—	—	—	—	—	—	—	—	—	—	—	—
161	Edoliisoma talautense M. & Wg. . . .	423	—	—	—	—	—	—	—	—	—	—	—	—
162	Edoliisoma emancipata Hart.	424	—	—	—	—	—	—	—	—	—	—	—	—
163	Edoliisoma obiense Salvad.	424	—	—	—	—	—	—	—	—	—	—	—	—
164	Lalage leucopygialis Tweedd.	425	—	—	—	—	—	—	—	—	—	—	—	—

Celebesian Area																		
		Celebes																
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
																			Muscicapula westermanni.
																			Muscicapula hyperythra.
	*	*	*	*	*	*	*		*	**									Siphia banyumas.
*		*?					**?**												Siphia djampeana.
										*									Siphia kalaoensis.
						*	*												Siphia rufigula.
							*												Siphia bonthaina.
											*								Stoparola septentrionalis.
												*							Stoparola meridionalis.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Hypothymis puella.
—	*	*?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Hypothymis rowleyi.
*	—	—	—	—	—	—	—	—	—	*	*	*	*	*	—	—	—	—	Rhipidura celebensis.
—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	Rhipidura teijsmanni.
—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	Zeocephus talautensis.
—	—	*	—	—	—	—	*	—	*	—	*	—	—	—	—	—	—	—	Monarcha commutatus.
—	—	*	*	—	—	*	*	*	*	—	—	—	—	—	—	—	—	—	Monarcha inornatus.
—	—	—	*	—	—	*	*	—	*	—	—	—	—	—	—	—	—	—	Monarcha everetti.
—	—	*	*	—	—	*	*	—	*	—	—	—	—	—	—	—	—	—	Myiagra rufigula.
—	—	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	Culicicapa helianthea.
—	—	—	—	—	—	—	*	—	*	—	—	—	—	—	—	—	—	—	Gerygone flaveola.
—	—	*	—	—	—	—	*	—	*	—	—	—	—	—	—	—	—	—	Pratincola caprata.
—	—	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	Pachycephala sulfurivent.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Pachycephala meridional.
—	—	—	—	—	—	—	*?	—	*	—	—	—	—	—	—	—	—	—	Pachycephala teijsmanni.
—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	Pachycephala orpheus.
—	—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	Pachycephala griseonota.
—	—	—	—	—	—	—	—	—	—	—	*	*	*	—	—	—	—	—	Pachycephala clio.
—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	Pachycephala everetti.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Pachycephala bonthaina.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Pachycephala bouensis.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Colluricincla sangirensis.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Lanius tigrinus.
*	*	*	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	Lanius lucionensis.
—	—	*	*	*	*	—	—	*	—	—	—	—	—	—	—	—	—	—	Graucalus bicolor.
—	*?	*	*	*	*	—	*	—	—	—	—	—	—	—	—	—	—	—	Graucalus leucopygius.
—	—	*	—	*	—	—	—	—	—	—	—	*	—	—	—	—	—	—	Graucalus temmincki.
—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	—	Graucalus schistaceus.
—	—	—	—	—	—	—	—	—	—	—	*	*	*	*	*	—	*	—	Graucalus melanops.
—	—	—	—	—	—	*	*	—	—	—	—	—	—	—	—	—	—	—	Edoliisoma morio (typ.).
—	—	*	—	—	*?	—	—	—	—	—	—	—	—	—	—	—	—	—	— morio septentrionalis.
—	—	—	*	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— morio—septentrion.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Edoliisoma salvadorii.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Edoliisoma talautense.
—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	Edoliisoma emancipata.
—	—	—	—	—	—	—	—	—	—	*	*	*	—	—	—	—	—	—	Edoliisoma obiense.
—	—	*	*	*	—	—	*	*	—	*	*	—	—	—	—	—	—	—	Lalage leucopygialis.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
165	Lalage timorensis (S. Müll.)	428	—	—	—	—	—	—	—	—	—	*?	—	—
166	Artamus leucogaster (Val.)	430	—	—	—	*	—	—	—	*	*	*	*	*
167	Artamus monachus Bp.	434	—	—	—	—	—	—	—	—	—	—	—	—
168	Dicrurus leucops Wall. (typical)	436	—	—	—	—	—	—	—	—	—	—	—	—
	— leucops—axillaris	437	—	—	—	—	—	—	—	—	—	—	—	—
	— leucops axillaris (Salvad.)	438	—	—	—	—	—	—	—	—	—	—	—	—
169	Dicrurus pectoralis Wall.	439	—	—	—	—	—	—	—	—	—	—	—	—
170	Dicaeum celebicum S. Müll.	441	—	—	—	—	—	—	—	—	—	—	—	—
171	Dicaeum sulaense Sharpe	443	—	—	—	—	—	—	—	—	—	—	—	—
172	Dicaeum sangirense Salvad.	444	—	—	—	—	—	—	—	—	—	—	—	—
173	Dicaeum talautense M. & Wg.	445	—	—	—	—	—	—	—	—	—	—	—	—
174	Dicaeum splendidum Bütt.	446	—	—	—	—	—	—	—	—	—	—	—	—
175	Dicaeum nehrkorni W. Blas.	447	—	—	—	—	—	—	—	—	—	—	—	—
176	Dicaeum hosei Sharpe	448	—	—	—	—	—	—	—	—	—	—	—	—
177	Acmonorhynchus aureolimbatus (Wall.)	449	—	—	—	—	—	—	—	—	—	—	—	—
178	Acmonorhynchus sangirensis (Salvad.)	451	—	—	—	—	—	—	—	—	—	—	—	—
179	Aethopyga flavostriata (Wall.)	453	—	—	—	—	—	—	—	—	—	—	—	—
180	Eudrepanis duivenbodei (Schl.)	456	—	—	—	—	—	—	—	—	—	—	—	—
181	Cyrtostomus frenatus (S. Müll.) (typical)	458	—	—	—	—	—	—	—	—	—	—	—	—
	— frenatus saleyerensis Hart.	458	—	—	—	—	—	—	—	—	—	—	—	—
	— frenatus>saleyerensis	458	—	—	—	—	—	—	—	—	—	—	—	—
	— frenatus<saleyerensis	459	—	—	—	—	—	—	—	—	—	—	—	—
	— frenatus dissentiens (Hart.)	460	—	—	—	—	—	—	—	—	—	—	—	—
182	Cyrtostomus teijsmanni (Bütt.)	462	—	—	—	—	—	—	—	—	—	—	—	—
183	Hermotimia auriceps (G. R. Gray)	464	—	—	—	—	—	—	—	—	—	—	—	—
184	Hermotimia porphyrolaema (Wall.) (typ.)	465	—	—	—	—	—	—	—	—	—	—	—	—
	— porphyrolaema scapulata M. & Wg.	466	—	—	—	—	—	—	—	—	—	—	—	—
185	Hermotimia grayi (Wall.)	467	—	—	—	—	—	—	—	—	—	—	—	—
186	Hermotimia sangirensis (A. B. M.)	469	—	—	—	—	—	—	—	—	—	—	—	—
187	Hermotimia talautensis M. & Wg.	470	—	—	—	—	—	—	—	—	—	—	—	—
188	Anthreptes malaccensis (Scop.) (typical)	472	—	—	—	*	—	—	*	*	*	*	—	*?
	— malaccensis celebensis (Shell.)	475	—	—	—	—	—	—	—	—	—	—	—	—
	— malaccensis chlorigaster (Sharpe)	477	—	—	—	—	—	—	—	—	—	—	*	—
189	Myzomela chloroptera Tweedd.	478	—	—	—	—	—	—	—	—	—	—	—	—
190	Melilestes celebensis M. & Wg. (typical)	481	—	—	—	—	—	—	—	—	—	—	—	—
	— celebensis meridionalis M. & Wg.	482	—	—	—	—	—	—	—	—	—	—	—	—
191	Myza sarasinorum M. & Wg.	483	—	—	—	—	—	—	—	—	—	—	—	—
192	Zosterops squamiceps (Hart.)	485	—	—	—	—	—	—	—	—	—	—	—	—
193	Zosterops intermedia (Wall.)	486	—	—	—	—	—	—	—	—	—	—	—	*
194	Zosterops atrifrons Wall.	487	—	—	—	—	—	—	—	—	—	—	—	—
195	Zosterops subatrifrons M. & Wg.	490	—	—	—	—	—	—	—	—	—	—	—	—
196	Zosterops nehrkorni W. Blas.	490	—	—	—	—	—	—	—	—	—	—	—	—
197	Zosterops sarasinorum M. & Wg.	491	—	—	—	—	—	—	—	—	—	—	—	—
198	Zosterops anomala M. & Wg.	494	—	—	—	—	—	—	—	—	—	—	—	—
199	Zosterops babelo M. & Wg.	495	—	—	—	—	—	—	—	—	—	—	—	—
200	Iole aurea (Tweedd.)	496	—	—	—	—	—	—	—	—	—	—	—	—

Celebesian Area													Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
		Celebes																	
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands							
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Lalage timorensis.
—	—	*	*	—	—	*	*	*	—	—	—	—	—	—	—	—	—	—	Artamus leucogaster.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Artamus monachus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicrurus leucops (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— leucops—axillaris.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— leucops axillaris.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicrurus pectoralis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicaeum celebicum.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicaeum sulaense.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicaeum sangirense.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicaeum talautense.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicaeum splendidum.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicaeum nehrkorni.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dicaeum hosei.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Acmonorh. aureolimbatus.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Acmonorh. sangirensis.
—	—	*	*	—	—	*	*	*	—	—	—	—	—	—	—	—	—	—	Aethopyga flavostriata.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Eudrepanis duivenbodei.
—	—	—	—	—	—	—	—	—	—	—	*	*	*	*	*	—	—	—	Cyrtostomus frenatus(typ.)
—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	— frenatus saleyerensis.
—	—	*	*	*	*	—	—	*	—	—	—	—	—	—	—	—	—	—	— — >saleyerensis.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	— — <saleyerensis.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	— frenatus dissentiens.
—	—	—	—	—	—	—	*?	—	—	*	—	—	—	—	—	—	—	—	Cyrtostomus teijsmanni.
—	—	—	—	*	—	—	—	—	—	—	*	*	*	*	—	—	—	—	Hermotimia auriceps.
—	—	—	*	—	—	*	*	—	—	—	—	—	—	—	—	—	—	—	H. porphyrolaema (typ.).
—	—	—	—	*	*?	—	—	*?	—	—	—	—	—	—	—	—	—	—	— — scapulata.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Hermotimia grayi.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Hermotimia sangirensis.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Hermotimia talautensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Anthrept.malaccens.(typ.).
—	—	*	*	*	*	—	*	*	—	—	*	*	—	—	—	—	—	—	— — celebensis.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — chlorigaster.
—	—	*	—	—	—	—	*	—	*	*	—	—	—	—	—	—	—	—	Myzomela chloroptera.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Melilestes celebensis(typ.).
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	— — meridionalis.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Myza sarasinorum.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Zosterops squamiceps.
—	—	—	*	—	—	*	*	—	*	*	—	—	*	—	—	—	—	—	Zosterops intermedia
—	—	*	*	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	Zosterops atrifrons.
—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	—	Zosterops subatrifrons.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Zosterops nehrkorni.
—	—	*	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Zosterops sarasinorum.
—	—	—	—	—	—	*	*	*?	—	—	—	—	—	—	—	—	—	—	Zosterops anomala.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Zosterops babelo.
—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	Iole aurea.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
201	Iole longirostris (Wall.)	497	—	—	—	—	—	—	—	—	—	—	—	—
202	Iole platenae (W. Blas.)	498	—	—	—	—	—	—	—	—	—	—	—	—
203	Malia grata Schl. (typical)	499	—	—	—	—	—	—	—	—	—	—	—	—
	— grata recondita (M. & Wg.)	500	—	—	—	—	—	—	—	—	—	—	—	—
204	Androphilus castaneus (Bütt.)	502	—	—	—	—	—	—	—	—	—	—	—	—
205	Cataponera turdoides Hart.	503	—	—	—	—	—	—	—	—	—	—	—	—
206	Trichostoma celebensis (Strickl.)	504	—	—	—	—	—	—	—	—	—	—	—	—
207	Trichostoma finschi Tweedd.	506	—	—	—	—	—	—	—	—	—	—	—	—
208	Malacopteron affine (Blyth)	508	—	—	—	—	—	—	*	*	*	*	—	—
209	Geocichla erythronota Scl.	509	—	—	—	—	—	—	—	—	—	—	—	—
210	Merula celebensis Bütt.	510	—	—	—	—	—	—	—	—	—	—	—	—
211	Petrophila cyanus (L.) (typical)	512	—	*	*	*	*	*	*	*	*	—	*	*
	— cyanus solitaria (P. L. S. Müll.)	512	—	*	*	*	*	*	*	*	*	*	*	*
212	Cisticola cursitans (Frkl.)	515	—	—	—	*	*	—	*	—	*	—	*	*
213	Cisticola exilis (Vig. Horsf.)	517	—	—	—	—	—	—	—	—	—	—	—	—
214	Phyllergates riedeli M. & Wg.	519	—	—	—	—	—	—	—	—	—	—	—	—
215	Acrocephalus orientalis (Temm. Schl.)	521	—	—	*	*	*	*	*	*	*	*	*	*
216	Locustella fasciolata (G. R. Gray)	524	—	—	*	—	*	*	—	—	—	—	*	—
217	Locustella ochotensis (Midd.)	526	—	—	*	—	*	*	—	—	—	*	*	—
218	Phylloscopus borealis (Blas.)	527	*	—	*	*	*	*	*	*	—	*	*	*
219	Cryptolopha sarasinorum M. & Wg.	530	—	—	—	—	—	—	—	—	—	—	—	—
220	Motacilla flava L.	531	*	*	*	*	*	—	*	*	*	*	*	*
221	Motacilla boarula L. (typical)	534	—	*	*	—	—	—	—	—	—	—	—	—
	— boarula melanope (Pall.)	535	—	—	*	*	*	*	*	*	*	*	*	*
222	Anthus gustavi Swinh.	538	—	—	*	—	*	—	—	—	—	*	*	*
223	Anthus cervinus (Pall.)	540	*	*	*	*	*	—	—	—	—	*	*	—
224	Munia oryzivora (L.)	542	—	*	—	*	*	*	*	*	*	*	*	*
225	Munia formosana Swinh. (typical)	544	—	—	—	—	*	—	—	—	—	—	*	—
	— formosana jagori (Marts.)	544	—	—	—	—	—	—	—	—	—	—	*	—
	— formosana brunneiceps (Wald.)	544	—	—	—	—	—	—	—	—	—	*	—	—
226	Munia pallida Wall.	546	—	—	—	—	—	—	—	—	—	—	—	*
227	Munia subcastanea Hart.	548	—	—	—	—	—	—	—	—	—	—	—	—
228	Munia punctulata nisoria (Temm.)[1]	548	—	—	—	—	—	—	*	*	*	—	—	*
229	Munia molucca (L.) (typical)	549	—	—	—	—	—	—	—	—	—	—	—	—
	— molucca propinqua Sharpe	550	—	—	—	—	—	—	—	—	—	—	—	*
	— molucca—propinqua	550	—	—	—	—	—	—	—	—	—	—	—	—
	— molucca<propinqua	551	—	—	—	—	—	—	—	—	—	—	—	—
	— molucca typica>	551	—	—	—	—	—	—	—	—	—	—	—	—
	— molucca kangeanensis (Vordm.)[2]	551	—	—	—	—	—	—	—	—	—	—	—	—
230	Passer montanus (L.)	553	—	*	*	*	*	*	*	*	*	—	*	—
231	Calornis panayensis (Scop.) (typical)	555	—	—	—	—	—	—	—	—	—	—	*	—
	— panayensis chalybea (Horsf.)	556	—	—	—	—	—	—	*	*	*	*	—	—
	— panayensis affinis (Hay)	556	—	—	—	*	—	—	—	—	—	—	—	—
	— panayensis chalybea—affinis	556	—	—	—	*	—	—	—	—	—	—	—	—
	— panayensis tytleri (Hume)	557	—	—	—	*	—	—	—	—	—	—	—	—

[1] Five races recognised by Sharpe. [2] Kangeang.

Celebesian Area																			
		Celebes																	
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	—	Iole longirostris.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Iole platenae.
—	—	—	—	—	—	—	*	—	*?	—	—	—	—	—	—	—	—	—	Malia grata (typical).
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— grata recondita.
—	—	*	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Androphilus castaneus.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Cataponera turdoides.
—	—	*	*	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Trichostoma celebensis.
—	—	—	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Trichostoma finschi.
—	—	—	—	*	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Malacopteron affine.
—	—	*	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Geocichla erythronota.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Merula celebensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Petrophila cyanus (typ.).
*	*	*	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	— cyanus solitaria.
—	—	—	—	—	—	*	*	—	—	—	*	—	—	—	—	—	—	—	Cisticola cursitans.
—	—	*	*	—	*	*	*	*	—	—	*	—	*	*	*	—	—	—	Cisticola exilis.
—	—	*	—	—	—	*	*	—	—	—	—	—	—	—	—	—	—	—	Phyllergates riedeli.
—	—	*	—	—	—	—	*	—	—	—	—	—	*	—	—	—	—	—	Acrocephalus orientalis.
*	*	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	Locustella fasciolata.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Locustella ochotensis.
*	*	*	—	—	—	—	*	—	*	*	—	*	*	—	—	—	—	—	Phylloscopus borealis.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Cryptolopha sarasinorum.
*	—	*	—	*	—	—	*	—	*	*	—	—	*	—	—	—	—	—	Motacilla flava.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Motacilla boarula (typ.).
—	—	*	—	—	—	—	*	—	—	—	—	—	*	*	—	—	—	—	— boarula melanope.
—	—	*	—	—	—	—	—	—	—	*	—	—	*	—	—	—	—	—	Anthus gustavi.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Anthus cervinus.
—	—	*	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Munia oryzivora.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Munia formosana (typical).
—	—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	— — jagori.
—	—	*	*	—	*	*	*	—	—	—	—	—	—	—	—	—	—	—	— — brunneiceps.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Munia pallida.
—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Munia subcastanea.
—	—	—	—	—	—	*	*	—	—	—	—	—	—	*	—	—	—	—	Mun. punctulata nisoria[1]).
—	—	—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	Munia molucca (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	— — propinqua.
—	*	*	—	—	—	*	*	—	—	—	*	*	—	—	—	—	—	—	— molucca—propinqua.
—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	—	—	—	— — <propinqua.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— molucca typica>.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — kangeanensis[2]).
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Passer montanus.
—	—	*	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	Calornis panayensis (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— panayensis chalybea.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — affinis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — chalybea—affinis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — tytleri.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
231	Calornis panayensis sangirensis (Salvad.)	557	—	—	—	—	—	—	—	—	—	—	—	—
	— panayensis—sangirensis	557	—	—	—	—	—	—	—	—	—	—	—	—
	— panayensis altirostris (Salvad.)[1]	558	—	—	—	—	—	—	—	—	—	—	—	—
	— panayensis enganensis (Salvad.)[2]	558	—	—	—	—	—	—	—	—	—	—	—	—
232	Calornis minor (Bp.)	561	—	—	—	—	—	—	—	—	—	—	—	*
233	Calornis sulaensis Sharpe.	561	—	—	—	—	—	—	—	—	—	—	—	—
234	Calornis metallica (Temm.)	562	—	—	—	—	—	—	—	—	—	—	—	—
235	Enodes erythrophrys (Temm.)	564	—	—	—	—	—	—	—	—	—	—	—	—
236	Acridotheres cinereus Bp.	566	—	—	—	—	—	—	—	—	—	—	—	—
237	Scissirostrum dubium (Lath.).	567	—	—	—	—	—	—	—	—	—	—	—	—
238	Sturnia violacea (Bodd.).	570	—	—	—	—	—	*	—	—	—	*	*	—
239	Basileornis celebensis G.R.Gray . . .	572	—	—	—	—	—	—	—	—	—	—	—	—
240	Basileornis galeatus A.B.M.	574	—	—	—	—	—	—	—	—	—	—	—	—
241	Streptocitta albicollis (Vieill.)	575	—	—	—	—	—	—	—	—	—	—	—	—
242	Streptocitta torquata (Temm.)	577	—	—	—	—	—	—	—	—	—	—	—	—
243	Charitornis albertinae Schl.	579	—	—	—	—	—	—	—	—	—	—	—	—
244	Corvus enca (Horsf.) (Celebesian races)	581												
245	Gazzola typica Bp.	584	—	—	—	—	—	—	—	—	—	—	—	—
246	Oriolus celebensis (Tweedd.) (typical) .	585	—	—	—	—	—	—	—	—	—	—	—	—
	— celebensis meridionalis Hart.. .	586	—	—	—	—	—	—	—	—	—	—	—	—
	— celebensis—meridionalis	586	—	—	—	—	—	—	—	—	—	—	—	—
247	Oriolus frontalis Wall.	589	—	—	—	—	—	—	—	—	—	—	—	—
248	Oriolus boneratensis M.&Wg.	589	—	—	—	—	—	—	—	—	—	—	—	—
249	Oriolus formosus Cab.	590	—	—	—	—	—	—	—	—	—	—	—	—
250	Oriolus melanisticus M.&Wg.	593	—	—	—	—	—	—	—	—	—	—	—	—
251	Osmotreron wallacei (Salvad.) (typical)	595	—	—	—	—	—	—	—	—	—	—	—	—
	— wallacei pallidior Hart.	597	—	—	—	—	—	—	—	—	—	—	—	—
252	Osmotreron sangirensis (Brügg.) . . .	598	—	—	—	—	—	—	—	—	—	—	—	—
253	Osmotreron vernans (L).	599	—	—	—	*	*	—	*	*	*	*	*	*
254	Ptilopus fischeri (Brügg.)	602	—	—	—	—	—	—	—	—	—	—	—	—
255	Ptilopus meridionalis M.&Wg.	604	—	—	—	—	—	—	—	—	—	—	—	—
256	Ptilopus gularis (Q.G.)	605	—	—	—	—	—	—	—	—	—	—	—	—
257	Ptilopus subgularis M.&Wg.	606	—	—	—	—	—	—	—	—	—	—	—	—
258	Ptilopus melanocephalus (Forst.) . . .	607	—	—	—	—	—	—	—	—	*	—	—	*
259	Ptilopus melanospilus (Salvad.). . . .	608	—	—	—	—	—	—	—	—	—	—	—	—
260	Ptilopus chrysorrhous (Salvad.). . . .	610	—	—	—	—	—	—	—	—	—	—	—	—
261	Ptilopus xanthorrhous (Salvad.) . . .	611	—	—	—	—	—	—	—	—	—	—	—	—
262	Ptilopus temmincki (Des Murs & Prév.)	613	—	—	—	—	—	—	—	—	—	—	*	—
263	Carpophaga concinna Wall.[3]	615	—	—	—	—	—	—	—	—	—	—	—	*
264	Carpophaga paulina (Bp.)	617	—	—	—	—	—	—	—	—	—	—	—	—
265	Carpophaga pulchella Tweedd.. . . .	619	—	—	—	—	—	—	—	—	—	—	—	—
266	Carpophaga intermedia M.&Wg. . . .	619	—	—	—	—	—	—	—	—	—	—	—	—
267	Carpophaga rosacea (Temm.).	620	—	—	—	—	—	—	—	—	—	—	—	*
268	Carpophaga pickeringi Cass.[3]	621	—	—	—	—	—	—	—	—	—	*	*	—

[1] Nias. [2] Engano. [3] Islet nomad.

Celebesian Area																				
		Celebes																		
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S.-E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
—	**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Calornis panayens. sangir.
—	—	*	*	*	*	*	*	*	—	—	—	—	—	—	—	—	—	—	— — panayensis – sangir.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — — altirostris.
—	—	—	*	*	*	*	*	*	—	—	—	—	—	—	—	—	—	—	— — — enganensis.
—	—	*	—	*	*	—	*	—	*	*	*	*	*	*	*	—	—	—	Calornis minor.
—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Calornis sulaensis.
—	—	—	—	*	—	—	*	—	—	—	*	*	—	—	—	—	—	—	Calornis metallica.
—	—	—	—	—	—	—	*	*	—	—	—	—	*	—	—	—	—	—	Enodes erythrophrys.
—	—	*	—	*	*	*	*	*	—	—	*	*	—	—	—	—	—	—	Acridotheres cinereus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Scissirostrum dubium.
—	—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	Sturnia violacea.
—	—	*	*	*	*	—	*	*	—	—	—	*	—	—	—	—	—	—	Basileornis celebensis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Basileornis galeatus.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Streptocitta albicollis.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Streptocitta torquata.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Charitornis albertinae.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Corvus enca (Cel. races).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Gazzola typica.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Oriolus celebensis (typ.).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— — meridionalis.
—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	— celebensis—meridion.
—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	—	Oriolus frontalis.
—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	Oriolus boneratensis.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Oriolus formosus.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Oriolus melanisticus.
—	—	*	*	*	*	—	*	—	*	—	*	*	—	—	—	—	—	—	Osmotreron wallacei (typ.).
—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	— wallacei pallidior.
—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Osmotreron sangirensis.
—	—	*	*	*	—	*	*	—	—	—	—	—	—	—	—	—	—	—	Osmotreron vernans.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Ptilopus fischeri.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Ptilopus meridionalis.
—	—	*	*	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Ptilopus gularis.
—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	Ptilopus subgularis.
—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	—	—	—	—	Ptilopus melanocephalus.
—	—	*	*	*	*	—	*	*	—	—	—	—	—	—	—	—	—	—	Ptilopus melanospilus.
—	—	—	—	—	—	—	—	—	—	—	*	*	*	—	—	—	—	—	Ptilopus chrysorrhous.
*	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Ptilopus xanthorrhous.
—	—	*	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Ptilopus temmincki.
*	*	—	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	Carpophaga concinna.
—	—	*	*	*	—	*	*	—	—	—	*	*	—	—	—	—	—	—	Carpophaga paulina.
—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	Carpophaga pulchella.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Carpophaga intermedia.
—	—	*	—	—	—	—	*	—	—	*	—	—	*	*	—	—	—	—	Carpophaga rosacea.
*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Carpophaga pickeringi.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
269	Carpophaga radiata (Q. G.)	622	—	—	—	—	—	—	—	—	—	—	—	—
270	Carpophaga forsteni (Bp.)	623	—	—	—	—	—	—	—	—	—	—	—	—
271	Carpophaga poecilorrhoa Brügg.	625	—	—	—	—	—	—	—	—	—	—	—	—
272	Myristicivora bicolor (Scop.)[1]	627	—	—	—	*	*	—	*	—	*	*	*	*
273	Myristicivora luctuosa (Temm.)	631	—	—	—	—	—	—	—	—	—	—	—	—
274	Columba albigularis (Bp.)	633	—	—	—	—	—	—	—	—	—	—	—	—
275	Turacoena manadensis (Q. G.)	635	—	—	—	—	—	—	—	—	—	—	—	—
276	Macropygia albicapilla Bp. (typical)	637	—	—	—	—	—	—	—	—	—	—	—	—
	— albicapilla sangirensis (Salvad.)	638	—	—	—	—	—	—	—	—	—	—	—	—
	— albicapilla—sangirensis	638	—	—	—	—	—	—	—	—	—	—	—	—
277	Macropygia macassariensis (Wall.)	641	—	—	—	—	—	—	—	—	—	—	—	—
278	Turtur tigrinus (Temm. Kn.)	643	—	—	—	*	*	—	*	*	*	*	*	*
279	Geopelia striata (L.)	646	—	*	—	*	*	—	*	*	*	*	*	*
280	Chalcophaps indica (L.)	649	—	—	—	*	*	—	*	*	*	*	*	*
281	Chalcophaps stephani Rchb.	653	—	—	—	—	—	—	—	—	—	—	—	—
282	Phlogoenas tristigmata Bp.	654	—	—	—	—	—	—	—	—	—	—	—	—
283	Phlogoenas bimaculata Salvad.	656	—	—	—	—	—	—	—	—	—	—	—	—
284	Caloenas nicobarica (L.)[1]	657	—	—	—	*	—	—	—	*	*	*	*	—
285	Excalfactoria chinensis (L.)[2]	663	—	—	—	*	*	—	*	*	*	*	*	—
286	Gallus ferrugineus (Gm.)	667	—	—	—	*	*	—	*	*	*	—	*	*
287	Megapodius cumingi Dillw.	671	—	—	—	—	—	—	—	—	—	*	*	—
288	Megapodius sangirensis Schl.	675	—	—	—	—	—	—	—	—	—	—	—	—
289	Megapodius bernsteini Schl.	676	—	—	—	—	—	—	—	—	—	—	—	—
290	Megapodius duperreyi Less. Garn.	677	—	—	—	—	—	—	—	—	—	—	—	*
291	Megacephalon maleo (Hartl.)	678	—	—	—	—	—	—	—	—	—	—	—	—
292	Turnix rufilatus Wall.	686	—	—	—	—	—	—	—	—	—	—	—	—
293	Turnix maculosa (Temm.)	687	—	—	—	—	—	—	—	—	—	—	—	—
294	Gymnocrex rosenbergi (Schl.)	689	—	—	—	—	—	—	—	—	—	—	—	—
295	Aramidopsis plateni (W. Blas.)	690	—	—	—	—	—	—	—	—	—	—	—	—
296	Hypotaenidia striata (L.)	692	—	—	—	*	*	—	*	*	*	*	*	—
297	Hypotaenidia philippensis (L.)[4]	694	—	—	—	—	—	—	—	—	—	*	*	*
298	Hypotaenidia celebensis (Q. G.)	697	—	—	—	—	—	—	—	—	—	—	—	—
299	Hypotaenidia sulcirostris (Wall.)	698	—	—	—	—	—	—	—	—	—	—	—	—
300	Rallina minahassa Wall.	699	—	—	—	—	—	—	—	—	—	—	—	—
301	Porzana fusca (L.)	701	—	—	—	*	*	*	*	*	*	*	*	—
302	Limnocorax niger (Gm.)	703	—	*	—	—	—	—	—	—	—	—	—	—
303	Amaurornis cinerea (Vieill.)	705	—	—	—	—	—	—	*	*	*	*	*	*
304	Amaurornis phoenicura (Forst.)	708	—	—	—	*	*	—	*	*	*	*	*	*
305	Amaurornis moluccana (Wall.)	711	—	—	—	—	—	—	—	—	—	—	—	—
306	Amaurornis isabellina (Schl.)	712	—	—	—	—	—	—	—	—	—	—	—	—
307	Gallinula frontata Wall.	713	—	—	—	—	—	—	—	—	—	*	—	*
308	Gallinula chloropus (L.)	715	—	*	*	*	*	*	—	*	*	*	*	—
309	Porphyrio calvus Vieill.	717	—	—	—	—	—	—	—	—	*	*	—	—

[1]) Islet nomad. [2]) Introd. into Mauritius and ? Bourbon. [3]) Introduced. [4]) Mauritius.

Celebesian Area																			
		Celebes																	
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
—	—	*	*	*	*	*	*	—	—	—	*	*	—	—	—	—	—	—	Carpophaga radiata.
—	—	*	*	*	*	*	*	—	—	—	*	*	—	—	—	—	—	—	Carpophaga forsteni.
—	—	*	*	*	*	*	*	—	—	—	*	*	—	—	—	—	—	—	Carpophaga poecilorrhoa.
—	—	*	*	*	*	*	*	—	—	—	*	*	*	*	—	—	—	—	Myristicivora bicolor [1]).
—	—	*	*	*	*	*	*	—	—	—	*	*	*	*	—	—	—	—	Myristicivora luctuosa.
—	—	*	*	*	*	*	*	—	—	—	*	*	*	*	—	—	—	—	Columba albigularis.
—	—	*	*	*	*	*	*	*	*	*	*	*	—	—	—	—	—	—	Turacoena manadensis.
—	—	*	*	*	*	*	*	*	*	*	*	*	—	—	—	—	—	—	Macropygia albicap. (typ.).
—	—	*	*	*	*	*	*	*	*	*	*	*	—	—	—	—	—	—	— — — sangirensis.
—	—	*	*	*	*	*	*	*	*	*	*	*	—	—	—	—	—	—	— albicapilla—sangir.
—	—	*	*	*	*	*	*	—	*	*	*	*	—	—	—	—	—	—	Macrop. macassariensis.
—	—	*	*	*	*	*	*	—	*	*	*	*	*	*	—	—	—	—	Turtur tigrinus.
—	—	*	*	*	*	*	*	—	*	*	*	*	*	*	—	—	—	—	Geopelia striata.
—	—	*	*	*	*	*	*	—	*	*	*	*	*	*	—	—	—	—	Chalcophaps indica.
—	—	*	*	*	*	*	*	—	*	*	*	*	*	*	—	—	—	—	Chalcophaps stephani.
—	—	*	*	*	*	*	*	—	*	*	*	*	*	*	—	—	—	—	Phlogoenas tristigmata.
—	—	—	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Phlogoenas bimaculata.
—	*	*	—	—	—	—	*	—	—	—	—	—	*	*	—	—	—	—	Caloenas nicobarica [1]).
—	—	*	—	—	—	—	*	—	—	—	—	—	*	—	*	—	—	—	Excalfactoria chinensis [2]).
—	*	*	—	—	*	*	*	*	—	—	—	—	—	—	—	—	—	—	Gallus ferrugineus.
—	—	*	*	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	Megapodius cumingi.
*	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Megapodius sangirensis.
—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	Megapodius bernsteini.
—	—	—	—	—	—	—	—	—	*	*	—	—	—	*	*	—	—	—	Megapodius duperreyi.
—	*[3])	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Megacephalon maleo.
—	—	*	*	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Turnix rufilatus.
—	—	—	*	—	—	—	—	*	—	—	—	—	—	*	*	—	—	—	Turnix maculosa.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Gymnocrex rosenbergi.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Aramidopsis plateni.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Hypotaenidia striata.
—	—	*	—	—	—	—	*	*	—	—	—	—	*	*	*	*	*	—	Hypotaenidia philippens. [4])
—	—	*	*	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	Hypotaenidia celebensis.
—	—	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	Hypotaenidia sulcirostris.
—	—	*	*	—	—	—	—	—	—	—	—	*	—	—	—	—	—	—	Rallina minahassa.
—	—	*	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Porzana fusca.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Limnocorax niger.
*	—	*	—	—	—	—	*	—	—	*	—	—	*	*	*	*	—	—	Amaurornis cinerea.
*	*	*	*	—	—	—	*	*	*	—	—	—	*	—	—	—	—	—	Amaurornis phoenicura.
—	*	—	—	—	—	—	—	—	—	—	—	—	*	*	*	—	—	—	Amaurornis moluccana.
—	—	*	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Amaurornis isabellina.
—	—	*	—	—	—	—	*	—	—	—	—	—	*	*	—	—	—	—	Gallinula frontata.
—	—	*	—	—	—	—	*	—	—	—	—	—	—	—	—	—	—	—	Gallinula chloropus.
—	—	*	—	—	—	—	*	—	—	—	—	—	*	*	*	*	*	—	Porphyrio calvus.

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
310	Porphyrio pulverulentus Temm.	721	—	—	—	—	—	—	—	—	—	—	*	—
311	Fulica atra L.	722	—	*	*	*	*	*	—	*	*	*?	*	—
312	Hydralector gallinaceus (Temm.)	725	—	—	—	—	—	—	—	—	*	*	—	—
313	Glareola isabella Vieill.[1]	728	—	—	—	—	—	—	—	—	*	*	—	*
314	Esacus magnirostris (Vieill.)	733	—	—	—	*	—	—	—	*	*	*	—	—
315	Lobivanellus cinereus (Blyth)	735	—	—	*	*	*	*	—	—	*	*	*	*
316	? Squatarola helvetica (L.)	736	*	*	*	*	*	*	*	—	*	*	*	*
317	Charadrius fulvus Gm.	738	*	*	*	*	*	*	*	*	*	*	*	*
318	Aegialitis vereda (J. Gd.)	741	—	—	*	*	*	—	—	—	*	—	*	*
319	Aegialitis geoffroyi (Wagl.)	743	—	*	*	*	*	*	*	*	*	*	*	*
320	Aegialitis mongola (Pall.)	746	*	*	*	*	*	*	*	*	*	*	*	*
321	Aegialitis curonica (Gm.)	749	*?	*	*	*	*	*	*	—	*	*	*	*
322	Aegialitis peroni (Schl.)	752	—	—	—	—	—	—	—	—	*	*	*	*
323	Strepsilas interpres (L.)	755	*	*	*	*	*	*	*	*	*	*	*	*
324	Himantopus leucocephalus J. Gd.	757	—	—	—	—	—	—	—	—	*	*	*	*
325	Totanus glottis (L.)	759	*	*	*	*	*	*	*	*	*	*	*	*
326	Totanus calidris (L.)	761	—	*	*	*	*	*	—	*	*	*	*	*
327	Totanus glareola (L.)	764	—	*	*	*	*	*	—	*	*	*	*	*
328	Heteractitis brevipes (Vieill.)	766	—	—	*	—	*	*	—	—	—	*	*	*
329	Actitis hypoleucos (L.)	770	—	*	*	*	*	*	*	*	*	*	*	*
330	Terekia cinerea (Güld.)	773	—	*	*	*	*	*	*	*	*	*	*	—
331	Tringa acuminata (Horsf.)	776	*	—	*	*	*	*	—	—	*	—	*	—
332	Tringa damascensis (Horsf.)	778	—	—	*	*	*	*	*	—	*	*	*	—
333	Tringa ruficollis Pall.	780	—	—	*	*?	*	*	*	—	*	*	*	*
334	? Calidris arenaria (L.)	782	*	*	*	*	*	*	—	—	*	*	—	—
335	Phalaropus hyperboreus (L.)	785	*	*	*	*	*	*	—	—	—	—	—	—
336	Limicola platyrhyncha (Temm.)	787	—	*	*	*	*	*	*	—	*	—	*	—
337	Gallinago megala Swinh.	789	—	—	*	—	*	*	—	—	—	*	*	—
338	Limosa novaezealandiae (G. R. Gray)	792	*	—	*	—	*	*	*	—	*	*	*	*
339	Numenius minutus J. Gd.	795	—	—	*	—	*	*	—	—	*	—	—	—
340	Numenius variegatus (Scop.)	797	—	—	*	—	*	*	—	*	*	*	*	*
341	? Numenius arquatus (L.)	799	—	—	*	*	*	*	*	*	*	*	*	—
342	Numenius cyanopus Vieill.	800	*	—	*	—	*	*	—	—	—	*	*	*
343	Plegadis falcinellus (L.)	803	*	*	*	*	*	—	—	*	*	*	—	—
344	Dissoura episcopus (Bodd.)	806	—	—	—	*	—	—	*	*	*	*	*	*
345	Platalea sp.	809												
346	Phoyx manilensis (Meyen)	811	—	—	—	*	*	—	*	*	*	*	*	—
347	Ardea sumatrana Raffl.	814	—	—	—	*	*	—	*	*	*	*	*	*
348	Notophoyx picata (J. Gd.)	816	—	—	—	—	—	—	—	—	—	—	—	—
349	Notophoyx novaehollandiae (Lath.)	817	—	—	—	—	—	—	—	—	*?	—	—	*
350	Demiegretta sacra (Gm.)	819	—	—	—	*	*	*	*	*	*	*	*	*
351	Herodias eulophotes Swinh.	824	—	—	—	*	*	*	—	—	—	—	—	—
352	Herodias garzetta (L.)	826	—	*	*	*	*	*	*	*	*	*	*	—
353	Herodias alba (L.)[2]	829	—	*	*	*	*	*	—	—	*	*	—	*

[1] Add Billiton. [2] Varies geographically.

Celebesian Area																								
		Celebes																						
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Porphyrio pulverulentus.
*	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Fulica atra.
*	*	*	—	—	*	*	*	—	*	—	—	—	*?	*	*?	—	—	—	Hydralector gallinaceus.
*	*	*	—	—	—	*	*	—	*	—	*	*	*	*	*	—	—	—	Glareola isabella [1]).
—	—	*	—	—	—	*	—	—	—	—	—	*	*	*	*	*	—	—	Esacus magnirostris.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Lobivanellus cinereus.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	*	*	—	—	*	? Squatarola helvetica.
—	—	*	—	—	—	*	*	—	*	—	—	—	*	*	*	*	*	—	Charadrius fulvus.
—	—	*	—	—	—	—	*	—	—	—	—	—	*	*	*	—	—	—	Aegialitis vereda.
—	—	*	—	—	—	—	*	—	—	—	*	—	*	*	*	*	—	—	Aegialitis geoffroyi.
—	—	*	—	—	—	—	*	*	—	—	—	—	*	*	*	—	—	—	Aegialitis mongola.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Aegialitis curonica.
—	—	*	—	—	—	—	*	—	*	—	—	—	*	*	*	*	*	*	Aegialitis peroni.
—	—	*	—	—	—	—	*	—	*	—	—	—	*	*	*	—	*	—	Strepsilas interpres.
*	—	*	—	—	—	*	*	—	*	—	—	—	*	*	*	—	—	—	Himantopus leucocephal.
*	*	*	—	—	*	*	*	—	*	—	—	—	*	*	*	*	—	—	Totanus glottis.
—	—	*	—	—	—	*	—	—	—	—	—	—	*	—	—	—	—	—	Totanus calidris.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	*	*	—	—	—	Totanus glareola.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	*	*	*	—	—	Heteractitis brevipes.
—	*	*	—	—	—	—	—	*	—	—	—	—	*	*	*	—	—	—	Actitis hypoleucos.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	—	*	—	—	—	Terekia cinerea.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	*	*	*	*	—	Tringa acuminata.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Tringa damascensis.
—	*	*	—	—	—	—	—	—	*	—	—	—	*	*	*	*	—	—	Tringa ruficollis.
—	—	*?	—	—	—	—	—	—	—	—	—	—	—	—	—	*	—	*	? Calidris arenaria.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	*	—	—	—	—	Phalaropus hyperboreus.
—	—	—	—	—	—	*	—	—	—	—	—	—	*	—	—	—	—	—	Limicola platyrhyncha.
—	—	*	—	—	—	—	*	—	*	—	—	—	*	—	—	*	—	—	Gallinago megala.
*	—	*	—	—	—	—	—	—	—	—	—	—	*	*	*	*	*	—	Limosa novaezealandiae.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	*	*	—	—	—	Numenius minutus.
*	*	*	—	—	—	—	*	*	—	—	—	*	*	*	*	*	—	—	Numenius variegatus.
—	—	*?	—	—	—	—	—	—	—	—	—	—	*	—	—	—	—	—	? Numenius arquatus.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	*	*	—	*	—	Numenius cyanopus.
—	—	*	—	—	—	—	*	—	—	—	—	—	—	*	*	—	—	—	Plegadis falcinellus.
—	—	*	—	—	*	*	—	—	—	—	—	—	—	—	—	—	—	—	Dissoura episcopus.
—	—	*	—	—	—	—	—	—	—	—	—	—							Platalea sp.
—	—	*	—	*	*	*	*	—	—	—	—	—	—	—	—	—	—	—	Phoyx manilensis.
—	*	*	—	—	—	—	—	—	—	—	—	—	*	*	*	—	—	—	Ardea sumatrana.
—	—	*	—	—	—	—	*	—	—	—	—	—	*	*	*	—	—	—	Notophoyx picata.
—	—	*	—	—	—	—	—	—	—	—	—	—	*	*	*	*	*	—	Notoph. novaehollandiae.
*	*	*	—	—	—	—	—	*	—	—	—	—	*	*	*	*	*	—	Demiegretta sacra.
—	—	*	—	—	—	—	—	—	—	—	—	—	—	*?	*?	—	—	—	Herodias eulophotes.
*	*	*	—	—	*	—	*	—	—	—	—	*	*	*	*	—	—	—	Herodias garzetta.
*	—	*	—	—	—	—	—	—	—	—	—	*	*	*	*	—	*?	—	Herodias alba [2]).

Number	Name of species	Page in the text	Nearctic Region	Ethiopian Region	Palaearctic Region	Indian Province	Chinese Province	Japan	Malay Peninsula	Sumatra	Java	Borneo	Philippine Islands	Lesser Sunda Islands
354	Herodias intermedia (Wagl.)	832	—	—	*	*	*	*	*	*	*	*	*	*
355	Bubulcus coromandus (Bodd.)	835	—	—	*	*	*	*	—	*	*	*	*	*
356	Ardeola speciosa (Horsf.)	838	—	—	—	—	—	—	—	—	—	*	*	*
357	Nycticorax caledonicus (Gm.)	841	—	—	—	—	—	—	—	—	—	*	*	*
358	Nycticorax manilensis Vig.	843	—	—	—	—	—	—	—	—	—	*	*	*
359	Nycticorax griseus (L.)	845	*	*	*	*	*	*	—	*	*	*	*	*
360	Gorsachius kutteri (Cab.)	848	—	—	—	—	—	—	—	—	—	*	*	*
361	Butorides javanica (Horsf.)[1]	851	—	*	*	*	*	*	*	*	*	*	*	*
362	Ardetta sinensis (Gm.)[2]	854	—	—	*	*	*	*	*	*	*	*	*	*
363	Ardetta eurhythma Swinh.	856	—	—	*	*	*	*	*	*	*	*	*	*
364	Ardetta cinnamomea (Gm.)	859	—	—	—	*	*	—	*	*	*	*	*	*
365	Xanthocnus flavicollis (Lath.)[3]	861												
366	Xanthocnus melaenus (Salvad.)	863	—	—	—	—	—	—	—	—	—	—	—	—
367	Nettopus pulchellus J. Gd.	865	—	—	—	—	—	—	—	—	—	—	—	—
368	Nettopus coromandelianus (Gm.)	866	—	—	—	*	*	—	*	*	*	*	*	—
369	Dendrocycna arcuata (Horsf.)	868	—	—	—	—	—	—	—	—	*	*	*	*
370	Dendrocycna guttata Schl.	870	—	—	—	—	—	—	—	—	—	—	*	—
371	Anas superciliosa Gm.	872	—	—	—	—	—	—	—	*?	*	—	—	*
372	Nettion gibberifrons (S. Müll.)	874	—	—	—	—	—	—	—	—	*	—	—	*
373	Querquedula circia (L.)	879	—	*	*	*	*	*	—	*	*	*	*	—
374	Nyroca fuligula (L.)	881	—	*	*	*	*	*	—	—	—	*	*	—
375	Fregata minor (Gm.)[4]	883												
376	Plotus melanogaster (Penn.)[5]	886	—	—	—	*	*	—	*	*	*	*	*	—
377	Phalacrocorax melanoleucus (Vieill.)	888	—	—	—	—	—	—	—	—	—	—	—	*
378	Phalacrocorax sulcirostris Brdt.	890	—	—	—	—	—	—	—	—	—	*	—	*
379	Sula leucogaster (Bodd.)[6]	892												
380	Hydrochelidon leucoptera (Meisn. Sch.)	893	—	*	*	*	*	—	—	—	*	*	*	—
381	Hydrochelidon hybrida (Pall.)	895	—	*	*	*	*	—	—	—	*	*	*	—
382	Sterna media Horsf.	897	—	*	*	*	—	—	*	*	*	—	—	—
383	Sterna bergii Lcht.	899	—	*	—	*	*	*	—	*	*	*	*	*
384	Sterna sinensis Gm.	901	—	—	*	*	*	*	*	*	*	*	*	*?
385	Sterna melanauchen Temm.[7]	903	—	—	—	*	*	—	*	*	—	*	—	*
386	Sterna anaestheta Scop.	906	*	*	—	*	*	*	*	*	*	*	*	*
387	Anous stolidus (L.)[8]	908												
388	Stercorarius sp.	910												
389	Puffinus cuneatus Salv.	911	—	—	—	—	—	—	—	—	—	—	—	—
390	Puffinus leucomelas (Temm.)	913	—	—	—	—	*	*	—	—	—	*	*	—
391	Diomedea sp.	914												
392	Podiceps tricolor (G. R. Gray)	915	—	—	—	—	—	—	—	—	—	—	—	*
393	Podiceps gularis J. Gd.	917	—	—	—	—	—	—	—	—	*	*?	—	—

[1] With racial differences. [2] Add Seychelles. [3] Racial differences not perfectly understood. [4] Indian and Pacific Oceans.

Celebesian Area																		
		Celebes																
Talaut Islands	Sangi Islands	North Peninsula	West Celebes	East Peninsula	Togian Islands	Central Celebes	South Peninsula	S. E. Peninsula (and Buton)	Saleyer Island	Djampea Group	Peling Group	Sula Islands	Moluccas	Papuasia	Australia	Polynesia	New Zealand	Neotropical Region	Name of species
—	—	✱	—	—	—	—	—	—	—	—	—	—	✱	✱	✱	—	—	—	Herodias intermedia.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Bubulcus coromandus.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Ardeola speciosa.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Nycticorax caledonicus.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Nycticorax manilensis.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Nycticorax griseus.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Gorsachius kutteri.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Butorides javanica [1]).
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Ardetta sinensis [2]).
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Ardetta eurhythma.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Ardetta cinnamomea.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Xanthocnus flavicollis [3]).
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Xanthocnus melaenus.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Nettopus pulchellus.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Nettop. coromandelianus.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Dendrocygna arcuata.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Dendrocygna guttata.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Anas superciliosa.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	✱	—	Nettion gibberifrons.
—	—	✱	—	—	—	—	—	—	—	—	—	—	✱	—	—	—	—	—	Querquedula circia.
—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	✱	—	—	Nyroca fuligula.
—	—	✱	—	—	—	—	✱	—	—	—	—	—							Fregata minor.
—	—	✱	—	—	—	—	✱	—	—	—	—	—	—	—	—	—	—	—	Plotus melanogaster.
—	—	✱	—	—	—	—	—	—	—	✱	—	—	✱	✱	✱	✱	✱?	—	Phalacroc. melanoleucus.
—	—	✱	—	—	—	—	—	—	—	—	—	—	✱	✱	✱	—	—	—	Phalacroc. sulcirostris.
—	✱	✱	—	—	—	—	✱	—	—	—	—	—							Sula leucogaster.
—	✱	✱	—	—	—	—	✱	—	—	—	—	—	✱?	—	✱	—	✱	—	Hydrochelidon leucoptera
—	—	✱	—	—	✱	—	✱	—	—	—	—	—	✱	✱	✱	—	—	—	Hydrochelidon hybrida.
—	—	✱	—	—	✱	—	✱	—	—	—	—	—	—	✱	✱	—	—	—	Sterna media.
✱	—	✱	—	—	—	—	✱	—	—	—	—	—	✱	✱	✱	✱	—	—	Sterna bergii.
—	—	✱	—	—	—	—	—	—	—	—	—	—	—	✱	✱	—	—	—	Sterna sinensis.
—	—	✱	—	—	—	—	—	—	—	—	—	—	✱	✱	✱	✱	—	—	Sterna melanauchen.
—	✱	—	—	—	—	—	✱	—	✱	—	—	—	✱	✱	✱	✱	—	—	Sterna anaestheta.
—	✱	✱	—	—	—	—	—	—	—	—	—	—							Anous stolidus.
—	—	✱	—	—	—	—	—	—	—	—	—	—							Stercorarius sp.
—	—	✱	—	—	—	—	—	—	—	—	—	—	—	—	—	✱	—	—	Puffinus cuneatus.
—	—	✱	—	—	—	—	—	—	—	—	—	—	✱	✱	✱	—	—	—	Puffinus leucomelas.
—	—	✱	—	—	—	—	—	—	—	—	—	—							Diomedea sp.
—	—	✱	—	—	—	—	—	—	—	—	—	—	✱	✱	—	—	—	—	Podiceps tricolor.
✱	✱	—	—	—	—	—	—	—	—	—	—	—	—	✱	✱	—	—	—	Podiceps gularis.

[5]) Add Madagascar. [6]) The tropical and subtropical seas of the globe. [7]) Islands of the Indian Ocean. [8]) Tropical seas.

The Island of Celebes is now known to possess 15 peculiar genera of birds, some of which, indeed, range into other parts of the Celebesian area. These forms are of unequal values, that is to say some of them are very distinct from genera existing in other parts of the world, while others hardly possess any structural difference to warrant their distinction. We have, therefore, divided the Celebesian genera into three classes, according to their taxonomic value.

The following four are I. Class genera:

Megacephalon	*Cittura*
Streptocitta	*Scissirostrum*.

The Moleo, *Megacephalon*, has affinities with *Talegallus* and *Aepypodius* of New Guinea.

Streptocitta, a bird very similar in appearance to a Magpie, seems to occupy an intermediate position between the *Sturnidae* and *Corvidae*. It is probably most nearly allied to *Basileornis*, a Celebesian genus occurring on the mainland and known also by distinct species from Banggai and Ceram; the latter genus seems to have its nearest affinities with *Melanopyrrhus* of New Guinea. Hence *Streptocitta* does not seem to be of Oriental origin, but of Australasian (pp. 576, 573 of text).

Cittura, a low type of Kingfisher, has certain affinities with the still more primitive *Melidora* of New Guinea, but its direct descent from such a form is improbable, and its land of origin is hidden in doubt (p. 307 of text).

Scissirostrum, a Grosbeak-like Starling, has been variously treated by systematists, and in our opinion it has as near affinities with the Oriental *Acridotheres* as with anything, but its curious beak undoubtedly entitles it to an isolated position among the *Sturnidae* (p. 569 of text).

The following are II. Class genera:

Rhabdotorrhinus	*Malia*
Meropogon	*Cataponera*
Ceycopsis	*Enodes*
Myza	*Aramidopsis*.

The small Hornbill, *Rhabdotorrhinus*, is apparently most nearly related to the Philippine genus, *Penelopides* (p. 237 of text).

Forsten's Bee-eater, *Meropogon*, finds its nearest allies in *Nyctiornis* of the Oriental Region — not including the Philippines (pp. 259, 260 of text).

The little Kingfisher, *Ceycopsis*, seems to be intermediate between the red-backed section of *Ceyx* which ranges from India to the Philippines, and the blue-backed section of that genus found from the Philippines to the Solomon Islands, but it differs from both in possessing a minute inner toe, which is quite obliterated in all members of the genus *Ceyx*. We believe that indications may be found showing that the red-backed section of *Ceyx* is more ancient than the blue (pp. 274, 277 of text).

The Honey-sucker, *Myza*, belongs to the purely Australasian family of the *Meliphagidae*, a family which cannot, however, be sharply distinguished from the *Nectariniidae* of the Ethiopian, Oriental and Australian Regions. The nearest affinities of *Myza* are doubtful (p. 483 of text).

The Bulbul, *Malia*, appears to belong to Oates' *Crateropodinae*, a subfamily of the *Timeliidae*. The geographical limits of the group have not been defined, but it is very strongly represented in the Oriental Region and very sparingly in Papuasia. The nearest affinities of *Malia* are uncertain (p. 501 of text).

Cataponera, a Babbler, is related to genera of the Oriental Region (p. 504 of text).

Enodes, an aberrant Starling, is somewhat intermediate between the Indo-Australian *Calornis* and the Oriental *Acridotheres* (p. 565 of text).

Platen's Rail, *Aramidopsis*, is most closely allied to *Aramides* of South America (p. 691 of text).

The remaining three genera are what we have termed III. Class and are not of higher taxonomic value than 10 strongly characterized species. They are:

Spilospizias *Charitornis* *Gazzola.*

The ten species estimated to be of equal value with III. Class genera are:

1. *Microstictus fulvus* (Q. G.) or *wallacei* (Tw.)
2. *Hierococcyx crassirostris* (Tweedd.)
3. *Cranorrhinus cassidix* (Temm.)
4. *Monachalcyon monachus* (Bp.), or *princeps* R.
5. *Pachycephala bonensis* M. & Wg.
6. *Melilestes celebensis* M. & Wg.
7. *Carpophaga poecilorrhoa* Brügg.
8. *Phlogoenas tristigmata* Bp.
9. *Gymnocrex rosenbergi* (Schl.)
10. *Amaurornis isabellina* (Schl.)

The above ten, equal to III. Class genera, we propose to term I. Class species. Their differences from their nearest allies (not counting local forms of them in the Celebesian area itself) are about as great as those between *Corvus monedula* L. and *Corvus corone* L., or *Buteo vulgaris* Leach and *Aquila chrysaetus* (L.).

Then follow 22 II. Class species, differing as markedly from their nearest allies outside Celebes as, for instance, *Turdus musicus* L. from *Turdus merula* L. They are:

1. *Astur griseiceps* Schl.
2. *Accipiter rhodogaster* (Schl.)
3. *Trichoglossus ornatus* (L.)
4. — *meyeri* (Tweedd.)
5. *Prioniturus platurus* (Vieill.)
6. *Loriculus exilis* Schl.
7. — *stigmatus* (Müll. Schl.)
8. *Iyngipicus temmincki* (Malh.)
9. *Phoenicophaes calorhynchus* Temm.
10. *Coracias temmincki* (Vieill.)
11. *Hypothymis puella* (Wall.)
12. *Graucalus bicolor* (Temm.)
13. — *temmincki* (S. Müll.)
14. *Dicaeum nehrkorni* W. Blas.
15. *Acmonorhynchus aureolimbatus* (Wall.)
16. *Zosterops squamiceps* (Hart.)

17. *Zosterops anomala* M. & Wg.
18. *Trichostoma celebense* Strickl.
19. *Basileornis celebensis* G. R. Gray
20. *Ptilopus fischeri* Brügg.
21. — *gularis* (Q. G.)
22. *Carpophaga forsteni* (Bp.)

There are about 45 species in Celebes which may be relegated to the III. Class, differing from one another about as much as *Corvus corone* L. from *Corvus cornix* L., and for the most part geographical species. They need not be tabulated again here, but in the following table these III. Class species have been taken as the unit in computing the relationship of the avifauna of Celebes with those of the neighbouring countries. We have adopted the following scale:

One III. Class species, or V.(!) Class genus	=	1
One II. Class species, or IV. Class genus	=	2
One I. Class species, or III. Class genus	=	4
One . . . . . II. Class genus	=	8
One . . . . . I. Class genus	=	16

Species of lower value than the III. Class, and first class subspecies are valued at ·50; less pronounced races at ·25. We have not troubled to make finer estimations than these last[1]).

In attaching a value in this manner to species or genera, room for error due to the "personal equation" must be allowed for, but the method is obviously better than the usual addition and substraction of genera and species as if they were, respectively, units of equal worth. It is very evident, for instance, that *Megacephalon* suggests much more about ancient Celebes than does *Gazzola*, but it is another question whether the value of the former (four times as great as the latter) is correctly estimated.

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[1]) Besides the peculiar species of Celebes and the neighbouring islands, there are about 200 other Celebesian species which are either migratory or extend their range beyond the bounds of the area. They may be tabulated as follows, with the premonition that there is great uncertainty as to whether some species should be termed migratory or not:

Species occurring both in the Oriental and Australasian Regions (often migratory)	c. 60
Asiatic migrants	c. 64
Australian migrants	c. 5
Asiatic non-migrants	c. 38
Australian non-migrants	c. 34

It is sufficiently obvious that these species have nothing to say about the former distribution of land and water in the East Indies, and they should not be taken into consideration in questions of Geographical Distribution.

Estimated value of the affinities of the peculiar species of Celebes.[1])

Doubtful	Indo-Australian	Oriental	Bornean	Javan	Philippine	Name of species	Lesser Sundan	Moluccan	Papuasian	Australian	Australasian
—	—	—	1	—	—	1. *Spilornis rufipectus* J. Gd.	—	—	—	—	—
—	2	—	—	—	—	2. *Astur griseiceps* Schl.	—	—	—	—	—
4	—	—	—	—	—	3. *Spilospixias trinotatus* (Bp.)	—	—	—	—	—
2	—	—	—	—	—	4. *Accipiter rhodogaster* (Schl.)	—	—	—	—	—
—	—	—	—	—	1	5. *Spizaetus lanceolatus* (Bp.)	—	—	—	—	—
—	—	1	—	—	—	6. *Pernis celebensis* (Schl.)	—	—	—	—	—
—	—	—	·5	—	·5	7. *Baza celebensis* Schl.	—	—	—	—	—
—	1	—	—	—	—	8. *Ninox ochracea* (Schl.)	—	—	—	—	—
—	—	—	—	—	—	9. *Cephaloptynx punctulata* (Q. G.)	—	—	1	—	—
—	·5	—	—	—	—	10. *Scops manadensis* (Q. G.) (typical)	—	—	—	—	—
1	—	—	—	—	—	11. *Strix inexpectata* (Schl.)	—	—	—	—	—
—	—	—	—	—	—	12. *Trichoglossus ornatus* (L.)	—	1	1	—	—
—	—	—	—	—	—	13. *Trichoglossus meyeri* Tweedd.	2	—	—	—	—
—	—	—	—	—	—	14. *Cacatua sulphurea* (Gm.) (typical)	·5	—	—	—	—
—	—	—	—	—	2	15. *Prioniturus platurus* (Vieill.)	—	—	—	—	—
—	—	—	—	—	1	16. *Prioniturus flavicans* Cass.	—	—	—	—	—
—	—	—	—	—	1	17. *Tanygnathus muelleri* (Müll. Schl.)	—	—	—	—	—
—	—	—	—	—	—	18. *Loriculus exilis* Schl.	2	—	—	—	—
—	2	—	—	—	—	19. *Loriculus stigmatus* (Müll. Schl.)	—	—	—	—	—
—	—	—	—	—	2	20. *Iyngipicus temmincki* (Malh.)	—	—	—	—	—
—	—	—	—	—	4	21. *Microstictus fulvus* (Q. G.)	—	—	—	—	—
—	—	4	—	—	—	22. *Hierococcyx crassirostris* Tweedd.	—	—	—	—	—
—	—	—	—	—	—	23. *Cacomantis virescens* (Brügg.)	—	·5	—	—	—
—	1	—	—	—	—	24. *Eudynamis melanorhyncha* S. Müll.	—	—	—	—	—
—	—	—	—	1[2])	—	25. *Pyrrhocentor celebensis* (Q. G.)	—	—	—	—	—
—	—	—	—	2	—	26. *Phoenicophaes calorhynchus* Temm.	—	—	—	—	—
—	—	—	—	—	8	27. *Rhabdotorrhinus exaratus* (Temm.)	—	—	—	—	—
—	—	—	—	—	4	28. *Cranorrhinus cassidix* (Temm.)	—	—	—	—	—
—	—	8	—	—	—	29. *Meropogon forsteni* Bp.	—	—	—	—	—
—	—	—	·5	—	·5	30. *Pelargopsis melanorhyncha* (Temm.)	—	—	—	—	—
—	8	—	—	—	—	31. *Ceycopsis fallax* (Schl.)	—	—	—	—	—
—	—	·5	—	—	—	32. *Halcyon coromanda rufa* (Wall.)	—	—	—	—	—
—	—	—	—	—	2	33. *Monachalcyon monachus* (Bp.)	2	—	—	—	—
—	—	—	—	—	·5	34. *Monachalcyon princeps* Rchb.	·5	—	—	—	—
16	—	—	—	—	—	35. *Cittura cyanotis* (Temm.)[3])	—	—	—	—	—

[1]) Species occurring on the mainland, sometimes ranging into the islands of the area. Where two or more geographical races are found in the Celebesian area, the first described only is reckoned.

[2]) Literally Kangean. [3]) Probably Australasian.

Doubtful	Indo-Australian	Oriental	Bornean	Javan	Philippine	Name of species	Lesser Sundan	Moluccan	Papuasian	Australian	Australasian
—	—	2	—	—	—	36. *Coracias temmincki* (Vieill.)[1]	—	—	—	—	—
—	—	—	—	—	1	37. *Lyncornis macropterus* Bp.	—	—	—	—	—
—	—	—	—	—	1	38. *Caprimulgus celebensis* Grant	—	—	—	—	—
—	—	1	—	—	—	39. *Macropteryx wallacei* (J. Gd.)	—	—	—	—	—
—	—	—	—	—	·5	40. *Pitta celebensis* Müll. Schl.	—	·25	·25	—	—
—	—	—	·25	—	·25	41. *Pitta forsteni* Bp.	—	—	·5	—	—
—	—	—	—	—	1	42. *Siphia rufigula* (Wall.)	—	—	—	—	—
—	—	1	—	—	—	43. *Stoparola septentrionalis* Bütt.	—	—	—	—	—
—	—	2	—	—	—	44. *Hypothymis puella* (Wall.)	—	—	—	—	—
—	—	—	—	—	—	45. *Rhipidura teijsmanni* Bütt.	—	—	—	1	—
—	—	—	·5	—	·5	46. *Gerygone flaveola* Cab.	—	—	—	—	—
—	—	—	—	—	1	47. *Pachycephala sulfuriventer* (Tweedd.)	—	—	—	—	—
—	4	—	—	—	—	48. *Pachycephala bonensis* M. & Wg.	—	—	—	—	—
—	2	—	—	—	—	49. *Graucalus bicolor* (Temm.)	—	—	—	—	—
—	1	—	—	—	—	50. *Graucalus leucopygius* Bp.	—	—	—	—	—
—	—	—	—	—	—	51. *Graucalus temmincki* (S. Müll.)	—	—	2	—	—
—	—	—	—	—	—	52. *Edoliisoma morio* (S. Müll.)	—	—	1	—	—
—	—	1	—	—	—	53. *Lalage leucopygialis* Tweedd.	—	—	—	—	—
—	—	—	—	—	—	54. *Artamus monachus* Bp.	—	—	1	—	—
—	·5	—	—	—	—	55. *Dicrurus leucops* Wall.	—	—	—	—	—
—	—	—	1	—	—	56. *Dicaeum celebicum* S. Müll.	—	—	—	—	—
—	—	1	—	—	—	57. *Dicaeum nehrkorni* W. Blas.	—	—	1	—	—
—	—	1	—	—	—	58. *Dicaeum hosei* Sharpe	—	—	—	—	—
—	—	—	—	—	—	59. *Acmonorhynchus aureolimbatus* (Wall.)	2	—	—	—	—
—	—	1	—	—	—	60. *Aethopyga flavostriata* (Wall.)	—	—	—	—	—
—	—	—	—	—	—	61. *Cyrtostomus frenatus* (S. Müll.) (loc. races)	—	—	—	—	·5
—	—	—	—	—	—	62. *Hermotimia porphyrolaema* (Wall.)	—	1	—	—	—
—	—	·5	—	—	—	63. *Anthreptes malacc. celebensis* (Shelley)	—	—	—	—	—
—	—	—	—	—	—	64. *Myzomela chloroptera* Tweedd.	—	—	—	1	—
—	—	—	—	—	—	65. *Melilestes celebensis* M. & Wg.	—	—	4	—	—
—	—	—	—	—	—	66. *Myza sarasinorum* M. & Wg.	—	—	—	—	8
—	—	—	1	1	—	67. *Zosterops squamiceps* (Hart.)	—	—	—	—	—
—	—	—	—	—	—	68. *Zosterops atrifrons* Wall.	—	—	1	—	—
—	—	—	—	—	—	69. *Zosterops sarasinorum* M. & Wg.	·5	—	—	—	—
—	—	2	—	—	—	70. *Zosterops anomala* M. & Wg.[2]	—	—	—	—	—
8	—	—	—	—	—	71. *Malia grata* Schl.[3]	—	—	—	—	—
—	—	—	1	—	—	72. *Androphilus castaneus* (Bütt.)	—	—	—	—	—
—	—	8	—	—	—	73. *Cataponera turdoides* Hart.	—	—	—	—	—
—	—	2	—	—	—	74. *Trichostoma celebensis* Strickl.	—	—	—	—	—
—	—	—	—	—	—	75. *Geocichla erythronota* Scl.	1	—	—	—	—

[1]) Partly African. [2]) Chiefly Oriental. [3]) Probably Oriental.

Doubtful	Indo-Australian	Oriental	Bornean	Javan	Philippine	Name of species	Lesser Sundan	Moluccan	Papuasian	Australian	Australasian
—	—	—	—	1	—	76. *Merula celebensis* Bütt.	—	—	—	—	—
—	—	1	—	—	—	77. *Phyllergates riedeli* M. & Wg.	—	—	—	—	—
—	—	—	—	·5	—	78. *Cryptolopha sarasinorum* M. & Wg.	·5	—	—	—	—
—	—	—	—	—	·25	79. *Munia formosana brunneiceps* (Wald.)	—	—	—	—	—
—	—	—	—	—	—	80. *Munia subcastanea* Hart.	1	—	—	—	—
—	—	—	—	—	—	81. *Munia molucca—propinqua*	·25	—	—	—	—
—	8	—	—	—	—	82. *Enodes erythrophrys* (Temm.)	—	—	—	—	—
—	—	—	—	1	—	83. *Acridotheres cinereus* Bp.	—	—	—	—	—
16	—	—	—	—	—	84. *Scissirostrum dubium* (Lath.)[1]	—	—	—	—	—
—	—	—	—	—	—	85. *Basilornis celebensis* G. R. Gray	—	2	—	—	—
16	—	—	—	—	—	86. *Streptocitta albicollis* (Vieill.)[2]	—	—	—	—	—
4	—	—	—	—	—	87. *Gazzola typica* Bp.	—	—	—	—	—
—	—	·5	—	—	—	88. *Oriolus celebensis* (Tweedd.)	—	—	—	—	—
—	—	—	—	·5	—	89. *Osmotreron wallacei* Salvad.	—	—	—	—	—
—	—	—	—	—	2	90. *Ptilopus fischeri* Brügg.	—	—	—	—	—
—	—	—	—	—	2	91. *Ptilopus gularis* (Q. G.)	—	—	—	—	—
—	—	—	—	·25	—	92. *Ptilopus melanospilus* (Salvad.)	·25	—	—	—	—
—	—	—	—	—	·5	93. *Carpophaga paulina* (Bp.)	—	—	—	—	—
—	—	—	—	—	1	94. *Carpophaga radiata* (Q. G.)	—	—	—	—	—
—	—	—	—	—	2	95. *Carpophaga forsteni* (Bp.)	—	—	—	—	—
4	—	—	—	—	—	96. *Carpophaga poecilorrhoa* Brügg.[3]	—	—	—	—	—
—	1	—	—	—	—	97. *Myristicivora luctuosa* (Temm.)	—	—	—	—	—
—	—	—	—	—	—	98. *Turaeoena manadensis* (Q. G.)	1	—	—	—	—
—	—	—	—	—	—	99. *Macropygia albicapilla* Bp.	—	·5	—	—	—
—	—	—	—	—	—	100. *Macropygia macassariensis* (Wall.)	·5	—	—	—	—
—	—	—	—	—	2	101. *Phlogoenas tristigmata* Bp.	—	—	2	—	—
—	—	—	—	—	—	102. *Megacephalon maleo* (Hartl.)	—	—	16	—	—
—	—	—	—	—	—	103. *Turnix rufilatus* Wall.	1	—	—	—	—
—	—	—	—	—	—	104. *Gymnocrex rosenbergi* (Schl.)	—	2	2	—	—
8	—	—	—	—	—	105. *Aramidopsis plateni* (W. Blas.)[4]	—	—	—	—	—
—	—	—	—	—	—	106. *Hypotaenidia celebensis* (Q. G.)	—	—	1	—	—
—	—	—	—	—	1	107. *Rallina minahassa* Wall.	—	—	—	—	—
—	—	—	—	—	2	108. *Amaurornis isabellina* (Schl.)	—	—	—	—	2
79	31	37·5	5·75	7·25	44·5		15	7·25	33·75	2	10·5

[1]) Probably Oriental. [2]) Probably Australasian. [3]) Probably Oriental. [4]) S. American.

The above totals for each area added together give the sum of 273·5. The percentage of "Doubtful" components in the Celebes avifauna is then:

$$\frac{79 \times 100}{273{\cdot}5}, \text{ or } 29 \text{ per cent.}$$

In the same manner the percentage of the other components is obtained.

The total number of peculiar forms in Celebes is 108. Dividing the value of a species where the nearest affinities with these peculiar forms are found in two or more of the neighbouring areas, the shares are:

Doubtful	10	forms
Indo-Australian	12	»
Oriental (incl. Bornean and Javan)	29·25	»
Philippine	23·75	»
Lesser Sundan	13	»
Australasian	20	»
	108	

The table then affords the following percentages:

	Number of forms	Comparative value
Forms of doubtful affinities	9·3 per cent	29 per cent
Forms of Indo-Australian affinities	11·1 per cent	11·3 per cent
Forms of Oriental affinities (incl. also strictly Bornean and Javan)	27·0 per cent	18·46 per cent
Forms of Philippine affinities	22·0 per cent	16·27 per cent
Forms of Lesser Sundan affinities	12·0 per cent	5·5 per cent
Forms of Moluccan affinities	5·0 per cent	2·6 per cent
Forms of Papuasian and Australian affinities	13·5 per cent	16·94 per cent
	99·9	100·07

Thus, the forms of doubtful affinities in Celebes have the highest value, viz. a little over 3 each;

those of Indo-Australian and of Australasian affinities have the value 1
those of the Oriental Region about ·7
those of the Philippines about ·74
those of the Lesser Sunda Islands only about ·5.

Consequently, the "Doubtful" elements seem to be the oldest, and the Lesser Sundan generally the most recent in Celebes.

Including the Philippines in the Oriental Region, and comparing the area thus formed with the Australian Region, Celebes shows itself to be decidedly Oriental.

Oriental components . . 49 per cent, value 35·73 per cent
Australasian[1]) components 18·5 per cent, value 19·54 per cent

[1]) The Lesser Sundan forms are not added, being shared about equally between the Australian and Oriental Regions.

That is to say, one-half of the peculiar birds of Celebes have their nearest affinities in the Oriental Region, and one-fifth only in the Australian Region; but the Australasian forms seem to be on an average rather more strongly differentiated than the Oriental forms.

While the Philippines display nearly as many points of affinity with Celebes as do all the other parts of the Oriental Region taken together, they also show fewer points of dissimilarity — i. e. a far smaller number of genera not found in Celebes.

A comparison of all the genera occurring in the Philippines, Borneo, Java, and Papuasia and the Moluccas with those of the Celebesian area gives the following results[1]):

	Present in the Celebesian area	Absent in the Celebesian area
Genera occurring in the Philippines (not including Palawan) .	154	68
Genera occurring in the Bornean Group	150	147
Genera occurring in Java	135	125
Genera occurring in Papuasia and the Moluccas	136	169

The figures show that, as regards genera, the Celebesian area agrees much better with the Philippines than with the neighbouring countries.[2])

We now turn to examine the various parts of the Celebesian area itself, giving lists of the birds of the different groups of islands, with a few remarks on their general afffnities and derivation. The relations of the Northern and Southern Peninsulas of Celebes to one another are similarly discussed.

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[1]) The numbers are taken respectively from Prof. D. C. Worcester's "Contributions to Philippine Ornithology" (Pr. U. S. Nat. Mus. 1898 XX, pp. 551—564), Mr. Everett's "List of the Birds of the Bornean Group of Islands" (J. Str. Br. R. A. S. 1889, pp. 96—212), Dr. Vorderman's "List of the Birds of Java" (Nat. Tdschr. Ned. Ind. 1885, XLIV, pp. 189—207), and Count Salvadori's "Orn. Papuasia e Molucc." 1880—82 vols. I—III.

[2]) It would be suggestive to compare the number of the endemic genera and species of Celebes with those of other islands of the earth, say Borneo, Mindanao, Java, Timor, New Guinea, New Zealand, Madagascar, etc., etc., but such data are not yet readily available. It would, however, be worth while to draw up such lists, as we possess them to a greater or less extent for plants. We mention for instance that endemic genera of *Phanerogamae* are known from Fiji 13, Ceylon 21, New Zealand 22, Sandwich Islands 32, the Mascarenes 34, New Caledonia 38, Japan 48, Madagascar 91, and that from New Guinea about 35 are as yet known (see O. Warburg, Bot. Jahrb. 1891 XIII, 231).

List of the Birds of the Sangi Islands.

Name of species	Great Sangi	Siao	Tagulandang, Ruang & Biarro
1. *Spilornis rufipectus* J. Gd. (?typical)	—	∗	—
2. *Tachyspizias soloensis* (Horsf.)	∗	∗	—
3. *Butastur indicus* (Gm.)	∗	∗	—
4. *Haliastur indus* (Bodd.)	∗	∗	∗
5. *Pandion haliaetus* (L.) (typical)	∗	—	—
6. *Pandion haliaetus leucocephalus* (J. Gd.)	∗	∗	—
7. *Ninox scutulata japonica* (Temm. Schl.)	∗	∗	∗
8. *Scops manadensis* (Q. G.) (typical)	∗	∗	—
9. *Strix flammea rosenbergi* (Schl.)	∗	—	—
*10. *Eos histrio* (St. Müll.) (typical)	∗	∗	∗
11. *Prioniturus platurus* (Vieill.)	∗	∗	—
12. *Prioniturus flavicans* Cass.	?∗	—	—
*13. *Tanygnathus muelleri sangirensis* M. & Wg.	∗	—	—
14. ?*Tanygnathus luconensis* (L.)	∗	—	—
15. *Tanygnathus megalorhynchus* (Bodd.) (typ.)	∗	∗	∗
*16. *Loriculus catamene* Schl.	∗	–	—
17. *Cuculus canorus canoroides* (S. Müll.)	∗	—	—
18. *Eudynamis mindanensis sangirensis* (Blas.)	∗	∗	∗
19. *Centrococcyx bengalensis* (Gm.)	∗	∗	∗
20. *Merops ornatus* Lath.	∗	∗	—
21. *Alcedo ispida* L.	∗	∗	—
22. *Alcedo moluccana* (Less.)	∗	∗	—
*23. *Ceycopsis sangirensis* M. & Wg.	∗	–	—
24. *Halcyon coromanda rufa* (Wall.)	∗	∗	—
25. *Halcyon sancta* Vig. Horsf.	∗	∗	∗
26. *Halcyon chloris* (Bodd.) (typical)	∗	∗	∗
*27. *Cittura sangirensis* Sharpe	∗	∗	—
28. *Eurystomus orientalis* (L.)	∗	∗	∗
29. *Cypselus pacificus* (Lath.)	—	∗	—
*30. *Pitta palliceps* Brügg.	—	∗	∗
*31. *Pitta caeruleitorques* Salvad.	∗	—	–
*32. *Pitta sangirana* (Schl.)	∗	—	—
33. *Pitta irena* Temm.	—	—	∗
34. *Hirundo rustica gutturalis* (Scop.) and *H. rustica—gutturalis*	∗	—	—
35. *Hirundo javanica* Sparrm.	∗	–	—
*36. *Hypothymis rowleyi* (A. B. M.)	∗	–	—
*37. *Monarcha commutatus* Brügg.	∗	∗	—
*38. *Colluricinela sangirensis* (Oust.)	∗	—	—
39. *Lanius lucionensis* L.	∗	—	—
40. *Graucalus leucopygius* Bp.	∗	—	—
*41. *Edoliisoma salvadorii* Sharpe	∗	—	–
*42. *Dicrurus leucops—axillaris*	—	∗	∗
*43. *Dicrurus leucops axillaris* (Salvad.)	∗	—	—
*44. *Dicaeum sangirense* Salvad.	∗	—	—
*45. *Acmonorhynchus sangirensis* (Salvad.)	∗	—	—
46. *Eudrepanis duivenbodei* (Schl.)	∗	—	—
*47. *Hermotimia sangirensis* (A. B. M.)	∗	∗	∗
48. *Anthreptes malaccensis chlorigaster* (Sharpe)	∗	∗	—
*49. *Zosterops nehrkorni* W. Blas.	∗	—	—
*50. *Iole platenae* (W. Blas.)	∗	—	—
51. *Petrophila cyanus solitaria* (P. L. S. Müll.)	∗	—	—
52. *Locustella fasciolata* (G. R. Gray)	∗	—	—
53. *Phylloscopus borealis* (Blas.)	∗	—	—
54. *Munia molucca—propinqua*	∗	∗	∗
55. *Calornis panayensis sangirensis* (Salvad.)	∗	∗	—
* *Calornis panayensis—sangirensis*	—	—	∗
*56. *Oriolus formosus* Cab. (typical)	—	∗	—
*57. *Oriolus formosus sangirensis* M. & Wg.	∗	—	—
* *Oriolus formosus—sangirensis*	—	—	∗
*58. *Osmotreron sangirensis* (Brügg.)	∗	∗	∗
59. *Ptilopus xanthorrhous* (Salvad.)	∗	∗	∗
60. *Carpophaga eoneinna* Wall.	∗	∗	∗
61. *Myristicivora bicolor* (Scop.)	∗	∗	∗
62. *Columba albigularis* (Bp.)	—	—	∗
*63. *Macropygia albicapilla sangirensis* (Salvad.)	∗	∗	—
* *Macropygia albicapilla—sangirensis*	—	—	∗
64. *Turtur tigrinus* (Temm. Kn.)	—	∗	∗
65. *Chalcophaps indica* (L.)	∗	∗	∗
66. *Caloenas nicobarica* (L.)	∗	∗	—
67. *Gallus ferrugineus* (Gm.)	—	∗	—
68. *Megapodius sangirensis* Schl.	∗	∗	∗
69. *Megacephalon maleo* (Hartl.)	∗	∗	—
70. *Amaurornis phoenicura* (Forst.)	—	—	∗
71. *Amaurornis moluccana* (Wall.)	—	∗	—
72. *Aegialitis geoffroyi* (Wagl.)	∗	∗	—
73. *Heteractitis brevipes* (Vieill.)	∗	∗	—
74. *Actitis hypoleucos* (L.)	∗	∗	—
75. *Tringa ruficollis* Pall.	∗	—	—
76. *Numenius variegatus* (Scop.)	∗	∗	—
77. *Ardea sumatrana* Raffl.	—	∗	—
78. *Demiegretta sacra* (Gm.)	∗	∗	—
79. *Herodias garzetta* (L.)	∗	—	—
80. *Bubulcus coromandus* (Bodd.)	∗	—	—
81. *Nycticorax caledonicus* (Gm.)	∗	—	—
82. *Xanthocnus flavicollis* (Lath.)	—	∗	—
83. *Xanthocnus melaenus* (Salvad.)	∗	—	—
84. *Sula leucogaster* (Bodd.)	∗	∗	—
85. *Hydrochelidon leucoptera* (Meisn. Sch.)	∗	—	—
86. *Sterna anaestheta* Scop.	∗	—	—
87. *Anous stolidus* (L.)	∗?	—	—
88. *Podiceps gularis* J. Gd.	∗	—	—

* signifies autochthonous.

List of the Birds of the Talaut Islands.[1])

Name of species	Karkellang	Kabruang	Salibabu
1. *Tachyspizias soloensis* (Horsf.)	*	—	—
2. *Butastur indicus* (Gm.)	*	—	*
3. *Haliastur indus—girrenera*	—	*	*
4. *Pandion haliaetus* (L.)	—	—	*
Pandion haliaetus leucocephalus (J. Gd.)	*	—	—
5. *Ninox scutulata japonica* (Temm. Schl.)	—	*	*
*6. *Eos histrio talautensis* (M. & Wg.)	*	*	*
*7. *Prioniturus platurus talautensis* Hart.	*	—	*
*8. *Tanygnathus muelleri—sangirensis*	*	*	*
*9. *Tanygnathus talautensis* M. & Wg.	*	*	*
10. *Tanygnathus megalorhynchus* (Bodd.) (typ.)	*	*	*
11. *Cuculus canorus canoroides* (S. Müll.)	*	*	*
12. *Eudynamis mindanensis sangirensis* (W. Bl.)	*	*	*
13. *Centrococcyx bengalensis* (Gm.)	*	*	*
14. *Scythrops novachollandiae* Lath.	—	—	*
15. *Merops ornatus* Lath.	*	—	—
16. *Alcedo ispida* L.	*	—	—
17. *Alcedo moluccana* (Less.)	—	—	*
18. *Halcyon coromanda rufa* (Wall.)	*	—	*
19. *Halcyon sancta* Vig. Horsf.	*	*	—
20. *Halcyon chloris* (Bodd.) (typical)	*	*	*
21. *Eurystomus orientalis* (L.)	*	*	*
*22. *Pitta inspeculata* M. & Wg.	*	*	*
23. *Hirundo javanica* Sparrm.[2])	*	—	—
24. *Muscicapa griseosticta* (Swinh.)	*	—	*
*25. *Zeocephus talautensis* M. & Wg.	*	*	*
26. *Monarcha inornatus* (Garn.)	*	*	*
27. *Lanius lucioneusis* L.	*	*	—
*28. *Edoliisoma talautense* M. & Wg.	*	*	*
*29. *Dicaeum talautense* M. & Wg.	*	—	*
*30. *Hermotimia talautensis* M. & Wg.	*	*	*
*31. *Zosterops babelo* M. & Wg.	*	—	*
32. *Petrophila cyanus solitaria* (P. L. S. Müll.)	—	*	*
33. *Locustella fasciolata* (G. R. Gray)	*	—	*
34. *Phylloscopus borealis* (Blas.)	*	*	—
35. *Motacilla flava* L.	—	*	—
*36. *Munia molucca typica* >[3])	*	—	*
37. *Calornis panayensis sangirensis* (Salvad.)	*	*	*
*38. *Oriolus melanisticus* M. & Wg.	*	*	*
39. *Ptilopus xanthorrhous* (Salvad.)	*	*	*
40. *Carpophaga concinna* Wall.	*	*	*
*41. *Carpophaga intermedia* M. & Wg.	*	*	*
42. *Carpophaga pickeringi* Cass.	—	*	*
43. *Myristicivora bicolor* (Scop.)	*	*	*
44. *Chalcophaps indica* (L.)	—	—	*
45. *Macropygia albicapilla sangirensis* (Salvad.)	—	—	*
46. *Megapodius sangirensis* Schl.	*	*	*
47. *Amaurornis cinerea* (Vieill.)	*	*	*
48. *Amauroruis phoenicura* (Forst.)	—	*	—
49. *Porphyrio pulverulentus* Temm.	*	—	—
50. *Charadrius fulvus* Gm.	*	*	—
51. *Aegialitis vereda* (J. Gd.)	*	—	—
52. *Aegialitis geoffroyi* (Wagl.)	—	*	—
53. *Totanus glareola* (L.)	*	*	—
54. *Heteractitis brevipes* (Vieill.)	—	*	—
55. *Actitis hypoleucos* (L.)	—	*	*
56. *Limosa novaezealandiae* (G. R. Gray)	—	*	—
57. *Numenius variegatus* (Scop.)	—	*	—
58. *Demiegretta sacra* (Gm.)	—	*	—
59. *Herodias garzetta* (L.)	—	*	—
60. *Herodias alba* (L.)	—	*	—
61. *Bubulcus coromandus* (Bodd.)	—	*	—
62. *Gorsachius kutteri* (Cab.)	*	—	—
63. *Ardetta eurhythma* Swinh.[2])	*	—	—
64. *Xanthocnus flavicollis* (Lath.)	—	*	*
65. *Deudrocycna guttata* Schl.	*	*	—
66. *Dendrocycna arcuata* Horsf.[2])	*	—	—
67. *Sterna bergii* Lcht.	—	*	—
68. *Podiceps gularis* J. Gd.	—	*	—

[1]) A small collection of forty species obtained by Mr. Waterstradt's Bornean hunters on Salibabu has recently been recorded by Mr. Hartert (Novit. Zool. 1898, pp. 88—91). Of these 21 were new to Salibabu, and 3, *Pandion haliaetus*, *Alcedo moluccana*, and *Munia molucca*, had not yet been recorded from the group, though the last is present in the Dresden Museum from Karkellang, as well as a small form of *Pandion*. *Trichoglossus ornatus* (L.), *Iyngipicus temmincki* (Malh.), and *Lyncornis macropterus* Bp., are included in Mr. Hartert's list, but omitted in the above, as we have little doubt that they were obtained in Celebes. For the same reason Hartert omits *Oriolus celebensis* and *Dicrurus leucops*.

[2]) *Hirundo javanica*, *Ardetta eurhythma*, and *Dendrocycna arcuata* were included in a third collection from Talaut, received in 1897.

[3]) The formula *Munia molucca typica* > is more accurate than the *Munia molucca* > *propinqua* used in the text, p. 551, the Talaut birds being, as one might say, more typical than the type!

The nearest affinities of the peculiar species of the Sangi Islands.

	Celebes	Philippines	Bornean Group	Moluccas and Papuasia
1. *Eos histrio* (S. Müll.) (typical)	—	—	—	*
2. *Tanygnathus muelleri sangirensis* M. & Wg.	*	—	—	—
3. *Loriculus catamene* Schl.	—	—	—	*
4. *Ceycopsis sangirensis* M. & Wg.	*	—	—	—
5. *Cittura sangirensis* Sharpe	*	—	—	—
6. *Pitta palliceps* Brügg.	*	—	—	—
7. *Pitta caeruleitorques* Salvad.	—	*	—	—
8. *Pitta sangirana* (Schl.)	—	*	*	—
9. *Monarcha commutatus* Brügg.	—	—	—	*
10. *Hypothymis rowleyi* (A. B. M.)	*	—	*	—
11. *Colluricincla sangirensis* (Oust.)	—	—	—	*
12. *Edoliisoma salvadorii* Sharpe	—	—	—	*
13. *Dicrurus leucops axillaris* (Salvad.)	*	—	—	—
14. *Dicaeum sangirense* Salvad.	*	—	—	—
15. *Acmonorhynchus sangirensis* (Salvad.)	*	—	—	—
16. *Eudrepanis duivenbodei* (Schl.)	—	*	—	—
17. *Hermotimia sangirensis* (A. B. M.)	*	—	—	—
18. *Zosterops nehrkorni* W. Blas.	*	—	—	*
19. *Iole platenae* (W. Blas.)	Togian Sula	—	—	—
20. *Oriolus formosus* Cab.	—	*	—	—
21. *Osmotreron sangirensis* (Brügg.)	*	—	—	—
	12	4	2	6

The nearest affinities of the peculiar species of the Talaut Islands.

1. *Eos histrio talautensis* M. & Wg.	—	—	—	*
2. *Tanygnathus muelleri sangirensis* M. & Wg.	*	—	—	—
3. *Tanygnathus talautensis* M. & Wg.	—	*	—	—
4. *Prioniturus platurus talautensis* Hart.	*	—	—	—
5. *Pitta inspeculata* M. & Wg.	—	—	—	*
6. *Zeocephus talautensis* M. & Wg.	—	*	—	—
7. *Edoliisoma talautense* M. & Wg.	—	—	—	*
8. *Dicaeum talautense* M. & Wg.	*	—	—	—
9. *Hermotimia talautensis* M. & Wg.	*	—	—	—
10. *Zosterops babelo* M. & Wg.	—	*	—	—
11. *Munia molucca typica* >	—	—	—	*
12. *Oriolus melanisticus* M. & Wg.	—	*	—	—
13. *Carpophaga intermedia* M. & Wg.	—	*	*	—
	4	5	1	4

Six of the Talaut forms (numbers 1, 2, 7, 8, 9, 12) have still nearer affinities in Sangi, and there are five other species or subspecies which are "identical" in Sangi and Talaut. One of these latter (*Macropygia albicapilla sangirensis*) has

its nearest affinities in Celebes, one (*Eudynamis mindanensis sangirensis*) in the Philippines, and three (*Calornis panayensis sangirensis*, *Ptilopus xanthorrhous*, *Megapodius sangirensis*) in Celebes and the Philippines alike. Consequently it might be claimed that the Philippines are known at present to have 9 forms in Talaut, and Celebes only 8 forms; but as the avifauna of Sangi presents the strongest agreement with Talaut, and Sangi belongs to Celebes, it is convenient to include Talaut with Sangi in the Celebesian area.

The peculiar birds of the Sangi and Talaut Islands seem to be of comparatively recent origin; there is not a form among them which can be termed an ancient type. There is not a single peculiar genus, and all, or almost all, the endemic species are geographical races of forms in the lands lying near at hand to north, south, east or west. Moreover, ill-flying birds, such as the *Bucerotidae* and *Phoenicophainae*, are absent, or at least not known as yet. Everything points to the recent colonisation of these islands, and their highly volcanic or coral character and the deep sea around them are suggestive of their recent upheaval[1]).

As has been pointed out elsewhere, almost all of the peculiar species of Sangi and Talaut have increased in size (see p. 58).

List of the Birds of the Peling Group.

Name of species	Peling	Banggai	Name of species	Peling	Banggai
*1. *Spilornis rufipectus < sulaensis*	*	*	*13. *Lorieulus sclateri ruber* M. & Wg.	*	*
2. *Accipiter sulaensis* (Schl.)	*	*	14. *Aprosmictus sulaensis* Rchw.	*	—
3. *Haliaetus leucogaster* (Gm.)	—	*	15. *Cacomantis virescens* (Brügg.)	—	*
4. *Polioaetus humilis* (Müll. Schl.) (typical)	*	—	16. *Eudynamis melanorhyncha* S. Müll.	*	—
5. *Haliastur indus—girrenera*	*	—	17. *Merops ornatus* Lath.	*	—
6. *Pernis celebensis* (Wall.)	*	—	18. *Alcedo moluccana* (Less.)	*	—
7. *Baza celebensis* Schl.	—	*	19. *Alcedo meninting* Horsf.	*	*
8. *Tinnunculus moluce. orientalis—occidentalis*	*	—	*20. *Pelargopsis dichrorhyncha* M. & Wg.	*	*
9. *Pandion haliaetus leucocephalus* J. Gd.	—	*	21. *Haleyon coromanda rufa* (Wall.)	*	—
10. *Trichoglossus ornatus* (L.)	*	*	22. *Haleyon chloris* (Bodd.) (typical)	*	*
11. *Prioniturus platurus* (Vieill.)	*	*	23. *Haleyon sancta* V. & H.	—	*
12. *Tanygnathus muelleri* (Müll. Schl.) (typical)	*	*	24. *Eurystomus orientalis* (L.)	*	—

[1]) Such a change need call for no surprise; Worcester shows (Pr. U. S. Nat. Mus. 1898, 581) that such has evidently been the case with Siquijor, an island, with an area of about 90 sq. miles, to the north of Mindanao. "There is a tradition among the natives to the effect that the island has been thrown up from beneath the sea within a comparatively short time, and there is abundant geological evidence that this tradition is founded on fact. Every stone cracked open by the hammer shows evident signs of its coral origin. The tops of the highest hills, which rise a thousand feet above sea level, are strewn with the shells of the very same mollusks which to-day live along the shores. The hills themselves are mere masses of coral rag, to which a few trees cling with difficulty, as the soil washes down into the valleys almost as fast as it is formed. The fresh-water streams are without fish." Our native collectors sent 16 species in a small collection from Ruang, a volcano rising out of the sea close to Tagulandang in the Sangi Islands, and it is pretty certain that these species must have settled there since the eruptions of 1870 and 1871, which destroyed the vegetation (see p. 634 of text).

Name of species	Peling	Banggai	Name of species	Peling	Banggai
25. *Collocalia esculenta* (L.)	*	*	44. *Cisticola cursitans* (Frkl.)	*	—
26. *Macropteryx wallacei* (J. Gd.)	*	*	45. *Cisticola exilis* (Vig. Horsf.)	*	—
27. *Hypothymis puella blasii* Hart.	*	*	46. *Munia molucca—propinqua*	*	—
28. *Monarcha inornatus* (Garn.)	*	*	47. *Calornis sulaensis* Sharpe	*	*
29. *Culicicapa helianthea* (Wall.)	—	*	48. *Scissirostrum dubium* (Lath.)	*	*
30. *Pachycephala clio* Wall.	*	*	*49. *Basilcornis galeatus* A.B.M.	—	*
31. *Graucalus schistaceus* (Sharpe)	—	*	50. *Oriolus frontalis* Wall.	*	*
32. *Graucalus melanops* (Lath.)	*	—	51. *Osmotreron wallacei* (Salvad.) (typical)	*	*
33. *Edoliisoma obiense* Salvad.	*	*	*52. *Ptilopus subgularis* M. & Wg.	*	*
34. *Lalage leucopygialis* Tweedd.	*	*	53. *Ptilopus chrysorrhous* (Salvad.)	*	*
35. *Artamus leucogaster* (Val.)	*	*	54. *Carpophaga paulina* (Bp.)	*	*
36. *Artamus monachus* Bp.	—	*	55. *Myristicivora luctuosa* (Temm.)	*	*
37. *Dicrurus pectoralis* Wall.	*	*	56. *Columba albigularis* (Bp.)	—	*
38. *Dicaeum sulaense* Sharpe	—	*	57. *Turacoena manadensis* (Q. G.)	*	—
39. *Cyrtostomus frenatus* (S. Müll.)	*	*	58. *Macropygia albicapilla* Bp.	*	*
40. *Hermotinia auriceps* (G. R. Gray)	*	*	59. *Chalcophaps indica* (L.)	*	—
41. *Anthreptes malaccensis celebensis* (Shell.)	*	*	60. *Glareola isabella* Vieill.	*	—
*42. *Zosterops subatrifrons* M. & Wg.	*	—	61. *Aegialitis geoffroyi* (Wagl.)	*	—
43. *Iole longirostris* (Wall.)	*	*	62. *Nycticorax caledonicus* (Gm.)	—	*

List of the Birds of the Sula Islands.

*1. *Spilornis rufipectus sulaensis* (Schl.)
2. *Tachyspixias soloensis* (Horsf.)
3. *Accipiter sulaensis* (Schl.)
4. *Spizaetus lanceolatus* Temm. Schl.
5. ? *Ictinaetus malayensis* (Reinw.)
6. *Haliastur indus—girrenera*
7. *Baza celebensis* Schl.
*8. *Pisorhina sulaensis* Hart. †
9. *Ninox scutulata japonica* (Temm. Schl.)
*10. *Trichoglossus flavoviridis* Wall.
11. *Tanygnathus muelleri* (Müll. Schl.) (typical)
*12. *Loriculus sclateri* Wall. (typ.) (also from Mangoli †)
13. *Aprosmictus sulaensis* Rchw.
14. *Eudynamis melanorhyncha* S. Müll. (= **fascialis* Wall.)
15. *Cuculus canorus canoroides* (S. Müll.) †
16. *Cacomantis viresceus* Brügg. †
17. *Merops ornatus* Lath.
18. *Alcedo moluccana* (Less.)
*19. *Pelargopsis melanorhyncha eutreptorhyncha* Hart. †
*20. *Ceyx wallacei* Sharpe
21. *Halcyon coromanda rufa* (Wall.)
22. *Halcyon sancta* Vig. Horsf.
23. *Halcyon chloris* (Bodd.)
24. *Eurystomus orientalis* (L.)
25. *Macropteryx wallacei* (J. Gd.)
26. *Pitta irena* Temm.
*27. *Pitta dohertyi* Rothsch. (Bull. B. O. C. 1898, p. XXXIII)
28. *Hirundo javanica* Sparrm.
*29. *Hypothymis puella blasii* Hart. †
30. *Monarcha inornatus* (Garn.)
31. *Pachycephala griseonota* G. R. Gray (= *lineolata* Wall.)
32. *Pachycephala clio* Wall.
*33. *Rhinomyias colonus* Hart. †
34. *Graucalus melanops* (Lath.) †
35. *Graucalus schistaceus* (Sharpe)
36. *Graucalus temminckii* (S. Müll.) [1]
37. *Edoliisoma obiense* Salvad.
38. *Lalage leucopygialis* Wald. †
39. *Artamus monachus* Bp.
40. *Dicrurus pectoralis* Wall.
41. *Dicaeum sulaense* Sharpe
42. *Cyrtostomus frenatus* (S. Müll.)
43. *Hermotinia auriceps* (G. R. Gray)
44. *Anthreptes malaccensis celebensis* (Shell.)
45. *Zosterops subatrifrons* M. & Wg. (Sula Mangoli: Doherty) †
46. *Iole longirostris* (Wall.)
47. *Phylloscopus borealis* (Blas.) †
48. *Munia molucca—propinqua*
49. *Calornis sulaensis* Sharpe
50. *Calornis metallica* (Temm.)

† Mr. Hartert has kindly sent us (April, 1898) an early copy of his "List of a Collection of Birds made in the Sula Islands by William Doherty" (Nov. Zool. vol. V, Nr. 2, May 1898); all species marked † are new additions.

[1] Accidentally omitted in the distribution of the species in the text.

51. *Basileornis galeatus* A.B.M. †
*52. *Charitornis albertinae* Schl.
53. *Corvus enca* Horsf. (Celebesian race)
54. *Oriolus frontalis* Wall.
55. *Osmotreron wallaeei* Salvad. (typical)
56. *Ptilopus chrysorrhous* (Salvad.)
*57. *Ptilopus mangolieusis* Rothsch. (Bull. B. O. C. 1898, p. XXXIV)
58. *Carpophaga paulina* (Bp.)
59. *Myristicivora luctuosa* (Temm.)
60. *Columba albigularis* (Bp.) †
61. *Turacoena manadensis* (Q. G.)
62. *Macropygia albicapilla* Bp. (typical)
63. *Chaleophaps indica* (L.)
*64. *Megapodius bernsteini* Schl.
*65. *Hypotaenidia sulcirostris* (Wall.)
66. *Rallina minahassa* Wall.
67. *Amaurornis moluccana* (Wall.) †
68. *Esacus magnirostris* (Vieill.)
69. *Numenius variegatus* (Scop.)
70. *Herodias alba* (L.)
71. *Herodias garzetta* (L.)[1]
72. *Querquedula circia* (L.) †

Peling and Sula. The Peling or Banggai Archipelago and the Sula Group seem to have formed in comparatively recent times one large island. Although the island of Peling lies only about 12 miles from the coast of East Celebes, the majority of the characteristic Celebesian genera (*Microstictus*, *Pyrrhocentor*, *Phoenicophaes*, *Cranorrhinus*, *Rhabdotorrhinus*, *Monachalcyon*, *Cittura*, *Ceycopsis*, *Meropogon*, *Coracias*, *Myza*, *Malia*, *Cataponera*, *Enodes*, *Streptocitta*, *Megacephalon*, *Aramidopsis*) were not included in the only collection yet made upon the island, while the peculiar species or subspecies are generally the same as Sula forms. Fifteen species are identical with Sula forms, or are local races thereof, but only four agree with Celebes forms not known to occur in Sula; ten Sula species were not sent from Peling and Banggai (though some of them are pretty sure to occur there); while twenty-two Celebes species not known from Sula were contained in the above collection from the neighbouring mainland of Celebes, but not from Peling or Banggai (see, Abh. Mus. Dresd. 1896, Nr. 2, pp. 1—6).

List of the Birds of Saleyer Island.

1. *Spilornis rufipectus* J. Gd. [1])
2. *Haliaetus leucogaster* (Gm.)
*3. *Pernis sp.*
4. *Cuculus canorus canoroides* (S. Müll.)
5. *Alcedo moluccana* (Less.) [1])
6. *Alcedo ispida* L. [1])
7. *Halcyon chloris* (Bodd.) [1])
8. *Caprimulgus macrurus* Horsf. (typical)
9. *Macropteryx wallacei* (J. Gd.) [1])
10. *Siphia banyumas* (Horsf.)
11. *Culicicapa helianthea* (Wall.)
12. *Gerygone flaveola* Cab. [1])
13. *Pratincola caprata* (L.)
*14. *Pachycephala teijsmanni* Bütt.
15. *Pachycephala orpheus* Jard.
16. *Lalage timorensis* (S. Müll.)
17. *Artamus leucogaster* (Val.)
18. *Dicrurus leucops* Wall. (typical)
19. *Dicaeum splendidum* Bütt.
*20. *Cyrtostomus frenatus saleyerensis* Hart.
21. *Myzomela chloroptera* Tweedd.
22. *Zosterops intermedia* Wall.
23. ?*Malia grata* Schl. (typical)
24. *Phylloscopus borealis* (Blas.)
25. *Motacilla flava* L.
26. *Munia molucca* < *propinqua*
27. *Calornis minor* (Bp.) [1])
28. *Osmotreron wallacei* Salvad. (typical)
29. *Ptilopus melanocephalus* (Forst.)
30. *Macropygia macassariensis* (Wall.)
31. *Geopelia striata* (L.)
32. *Megapodius duperreyi* Less. Garn.
33. *Amaurornis phoenicura* (Forst.)
34. *Charadrius fulvus* Gm.
35. *Strepsilas interpres* (L.)
36. *Himantopus leucocephalus* J. Gd.
37. *Totanus glottis* (L.)
38. *Totanus calidris* (L.)

[1]) Accidentally omitted in the distribution of the species in the text.

39. *Actitis hypoleucos* (L.)
40. *Tringa ruficollis* Pall.
41. *Gallinago megala* Swinh.
42. *Bubulcus coromandus* (Bodd.)
43. *Butorides javanica* (Horsf.)
44. *Nettion gibberifrons* (S. Müll.)
45. *Sterna anaesthcta* Scop.

List of the Birds of the Djampea Group.

1. *Urospizias torquatus* (Temm.)
2. *Accipiter virgatus gularis* (Temm. Schl.)
3. *Elanus hypoleucus* J. Gd. [1])
4. *Baza reinwardti* Müll. Schl.
5. *Tinnunculus moluccensis occidentalis* M. & Wg. [1])
6. *Pandion haliaetus leucocephalus* (J. Gd.) [1])
7. *Ninox scutulata japonica* (Temm. Schl.)
8. *Strix flammea* L. (typical)
*9. *Trichoglossus forsteni djampeanus* Hart.
*10. *Cacatua sulphurea djampeana* Hart.
*11. *Tanygnathus megalorhynchus — sumbensis*
12. *Cuculus canorus canoroides* (S. Müll.)
13. *Centrococcyx bengalensis* (Gm.) [1])
14. *Alcedo moluccana* (Less.)
15. *Halcyon chloris* (Bodd.) [1])
16. *Eurystomus orientalis* (L.) [1])
17. *Caprimulgus macrurus* Horsf. (typical)
18. *Collocalia francica* (Gm.)
19. *Collocalia esculenta* (L.) [1])
*20. *Pitta virginalis* Hart.
*21. *Siphia djampeana* Hart.
*22. *Siphia kalaoensis* Hart.
(*?)23. *Rhipidura celebensis* Bütt.
24. *Monarcha inornatus* (Garn.)
*25. *Monarcha everetti* Hart.
26. *Myiagra rufigula* Wall.
*27. *Pachycephala everetti* Hart.
*28. *Edoliisoma emancipata* Hart.
29. *Lalage timorensis* (S. Müll.)
30. *Artamus leucogaster* (Val.)
31. *Dicaeum splendidum* Bütt.
(*?)32. *Cyrtostomus teijsmanni* Bütt.
33. *Myzomela chloroptera* Tweedd.
34. *Zosterops intermedia* Wall.
35. *Phylloscopus borealis* (Blas.)
36. *Motacilla flava* L.
37. *Anthus gustavi* Swinh.
38. *Munia molucca < propinqua*
39. *Calornis minor* (Bp.) [1])
*40. *Oriolus boneratensis* M. & Wg.
*41. *Osmotreron wallacei pallidior* Hart.
42. *Ptilopus melanocephalus* (Forst.)
43. *Carpophaga rosacea* (Temm.)
44. *Carpophaga concinna* Wall. [1])
45. *Myristicivora bicolor* (Scop.)
46. *Macropygia macassariensis* (Wall.)
47. *Megapodius duperreyi* Less. Garn.
48. *Amaurornis cinerea* (Vieill.)
49. *Esacus magnirostris* (Vieill.)
50. *Nycticorax caledonicus* (Gm.)
51. *Phalacrocorax melanoleucus* (Vieill.)

Saleyer and the Djampea Group. It has been shown by Büttikofer and Hartert that these islands have many points of affinity with Timor and the other Lesser Sunda Islands, as well as with Celebes. On counting out the respective forms, and allowing for the nearest affinities of the peculiar species, it appears that there are 9 Celebesian forms and 14 Lesser Sundan forms in these islands. Of the nine Celebesian forms four are not known from the Djampea Group, but only from Saleyer, as likewise two or three of the Lesser Sundan forms, so that it appears that the Djampea Group has much stronger relations with the islands to the south than with Celebes.

List of the Birds of Togian Island.

1. *Spilornis rufipectus* J. Gd. [1])
2. *Haliastur indus — girrenera* [1])
3. *Trichoglossus ornatus* (L.)
4. *Prioniturus platurus* (Vieill.)
5. *Prioniturus flavicans* Cass.
6. *Tanygnathus muelleri* (Müll. Schl.) (typical)
*7. *Loriculus quadricolor* Tweedd.
8. *Microstictus fulvus* (Q. G.)
9. ? *Cacomantis merulinus* (Scop.)
10. *Eudynamis melanorhyncha* S. Müll.

[1]) Accidentally omitted in the distribution of the species in the text.

11. *Pyrrhocentor celebensis* (Q. G.) (typical)
12. *Phoenicophaes calorhynchus* Temm. (typical)
13. *Cranorrhinus cassidix* (Temm.)
14. *Merops ornatus* Lath.[1])
15. *Aleedo meiningi* Horsf.
16. *Pelargopsis melanorhyncha* (Temm.)
17. *Haleyon coromanda rufa* (Wall.)
18. *Haleyon sancta* Vig. Horsf.
19. *Haleyon chloris* (Bodd.) (typical)
20. *Macropteryx wallacei* (J. Gd.)
21. *Pitta celebensis* Müll. Schl.
22. *Hirundo rustica gutturalis* (Scop.) and *H. rustica —gutturalis*
23. *Hirundo javanica* Sparrm.
24. *Hypothymis puella* (Wall.)
25. *Graucalus bicolor* (Temm.)
26. *Graucalus leucopygius* Bp.
27. *Edoliisoma morio* (S. Müll.)[1])
28. *Artamus leucogaster* (Val.)
29. *Dicrurus leucops* Wall. (typical)
30. *Dicaeum celebicum* S. Müll.
31. *Cyrtostomus frenatus > saleyerensis*
32. ?*Hermotimia porphyrolaema scapulata* M. & Wg.
33. *Anthreptes malaccensis celebensis* (Shell.)
*34. *Iole aurea* (Tweedd.)
35. *Cisticola exilis* (Vig. Horsf.)
36. *Munia formosana brunneiceps* (Wald.)
37. *Calornis panayensis* (Scop.) (typical)
38. *Scissirostrum dubium* (Lath.)
39. *Streptocitta torquata* (Temm.)
40. *Corvus enea* Horsf. (Celebesian race)
41. *Oriolus celebensis* (Tweedd.) (typical)
42. *Osmotreron wallacei* Salvad. (typical)
43. *Ptilopus melanospilus* (Salvad.)
*44. *Carpophaga pulchella* Tweedd.
45. *Turacoena manadensis* (Q. G.)
46. *Macropygia albicapilla* (Bp.) (typical)
47. *Chalcophaps indica* (L.)
48. *Gallus ferrugineus* (Gm.)
49. *Megapodius cumingi* Dillw.
50. *Charadrius fulvus* (Gm.)
51. *Totanus glareola* (L.)[1])
52. *Aetitis hypoleucos* (L.)
53. *Dissoura episcopus* (Bodd.)
54. *Phoyx manillensis* (Meyen)[1])
55. *Herodias garzetta* (L.)
56. *Hydrochelidon hybrida* (Pall.)
57. *Sterna media* Horsf.[1])

Only two species, *Loriculus quadricolor* and *Iole aurea*, are known to be peculiar to this group of islands in the Gulf of Tomini; for a third form, *Carpophaga pulchella*, which has been separated, is probably the same as *C. paulina*.

Peculiar species and subspecies of Celebes (Mainland).

1. *Spilornis rufipectus* J. Gd. (typical)
2. *Astur griseiceps* Schl.
3. ?*Astur tenuirostris* Brügg.
4. *Spilospizias trinotatus* (Bp.) (typical)
   Spilospizias trinotatus hacsitandus Hart.
5. *Accipiter rhodogaster* Schl.
6. *Ninox ochracea* (Schl.)
7. *Cephaloptynx punctulata* (Q. G.)
8. *Strix inexpectata* Schl.
9. *Trichoglossus meyeri* Tweedd. (typical)
   Trichoglossus meyeri bonthainensis (A. B. M.)
10. *Cacatua sulphurea* (Gm.) (typical)
11. *Loriculus exilis* Schl.
12. *Loriculus stigmatus* (Müll. Schl.)
13. *Iyngipicus temminckii* (Malh.)
14. *Microstictus fulvus* (Q. G.) ǂ
15. *Mierostictus wallacei* (Tweedd.)
16. *Hierococcyx crassirostris* Tweedd.
17. *Pyrrhocentor celebensis* (Q. G.) (typical) ǂ
    Pyrrhocentor celebensis rufescens M. & Wg.
18. *Phoenicophaes calorhynchus* Temm. (typical) ǂ
    Phoenicophaes calorhynchus meridionalis M. & Wg.
19. *Rhabdotorrhinus exaratus* (Temm.)
20. *Cranorrhinus cassidix* (Temm.) ǂ
21. *Meropogon forsteni* Bp.
22. *Ceycopsis fallax* (Schl.)
23. *Monachalcyon monachus* (Bp.) (typical)
    Monachalcyon monachus intermedius Hart.
24. *Monachalcyon capucinus* M. & Wg.
25. *Monachalcyon princeps* Rchb.
26. *Cittura cyanotis* (Temm.)
27. *Coracias temminckii* (Vieill.)
28. *Caprimulgus celebensis* Grant
29. *Lyncornis macropterus* Bp.
30. *Pitta forsteni* Bp.
31. *Pitta celebensis* Müll. Schl. ǂ
32. *Siphia rufigula* (Wall.)
33. *Siphia bonthaina* Hart.
34. *Stoparola septentrionalis* Bütt.
35. *Stoparola meridionalis* Bütt.
36. *Rhipidura teijsmanni* Bütt.
37. *Gerygone flaveola* Cab.
38. *Pachycephala sulfuriventer* (Tweedd.)
39. *Pachycephala meridionalis* Bütt.
40. *Pachycephala bonthaina* M. & Wg.
41. *Pachycephala bonensis* M. & Wg.

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[1]) Accidentally omitted in the distribution of the species in the text.
ǂ Occurs also on Togian Island.

42. *Graucalus bicolor* (Temm.) ‡
43. *Graucalus leucopygius* Bp. ‡
44. *Edoliisoma morio* (S. Müll. (typical)
Edoliisoma morio septentrionalis M. & Wg.
Edoliisoma morio — septentrionalis M. & Wg.
45. *Dicaeum celebicum* (S. Müll.) ‡
46. *Dicaeum nehrkorni* W. Blas.
47. *Dicaeum hosei* Sharpe
48. *Acmonorhynchus aureolimbatus* (Wall.)
49. *Aethopyga flavostriata* (Wall.)
50. *Cyrtostomus frenatus > saleyerensis* ‡
Cyrtostomus frenatus < saleyerensis
Cyrtostomus frenatus dissentiens (Hart.)
51. *Hermotimia porphyrolaema* (Wall.) (typical)
Hermotimia porphyrolaema scapulata M. & Wg.
52. *Hermotimia grayi* (Wall.)
53. *Melilestes celebensis* M. & Wg. (typical)
Melilestes celebensis meridionalis M. & Wg.
54. *Myza sarasinorum* M. & Wg.
55. *Zosterops squamiceps* (Hart.)
56. *Zosterops atrifrons* Wall.
57. *Zosterops sarasinorum* M. & Wg.
58. *Zosterops anomala* M. & Wg.
59. *Malia grata* Schl. (typical)
Malia grata recondita M. & Wg.
60. *Androphilus castaneus* (Bütt.)
61. *Cataponera turdoides* Hart.
62. *Trichostoma celebensis* (Strickl.)
63. *Trichostoma finschi* Tweedd.
64. *Geocichla erythronota* Scl.
65. *Merula celebensis* Bütt.
66. *Phyllergates riedeli* M. & Wg.
67. *Cryptolopha sarasinorum* M. & Wg.
68. *Munia subcastanea* Hart.
69. *Enodes erythrophrys* (Temm.)
70. *Acridotheres cinereus* Bp.
71. *Basileornis celebensis* G. R. Gray.
72. *Streptocitta albicollis* (Vieill.)
73. *Streptocitta torquata* (Temm.) ‡
74. *Gazzola typica* Bp.
75. *Oriolus celebensis* (Tweedd.) (typical) ‡
Oriolus celebensis meridionalis Hart.
Oriolus celebensis — meridionalis
76. *Ptilopus fischeri* (Brügg.)
77. *Ptilopus meridionalis* M. & Wg.
78. *Ptilopus gularis* (Q. G.)
79. *Ptilopus melanospilus* (Salvad.)
80. *Carpophaga radiata* (Q. G.)
81. *Carpophaga forsteni* (Bp.)
82. *Carpophaga poecilorrhoa* Brügg.
83. *Phlogoenas tristigmata* Bp.
84. *Phlogoenas bimaculata* Salvad.
85. *Megacephalon maleo* (Hartl.)
86. *Turnix rufilatus* Wall.
87. *Gymnocrex rosenbergi* (Schl.)
88. *Aramidopsis plateni* (W. Blas.)
89. *Hypotaenidia celebensis* (Q. G.)
90. *Amaurornis isabellina* (Schl.)

Contrast between North and South Celebes. Almost all links between the Lesser Sunda Islands and Celebes occur in the Southern Peninsula, but not always in the North. This is shown by *Butastur liventer*, *Chrysococcyx malayanus* and *basalis*, *Muscicapula westermanni*, *Lalage timorensis*, *Zosterops intermedia*, *Munia pallida* and *M. punctulata nisoria*, *Calornis minor*, *Macropygia macassariensis*, *Geopelia striata*, which are not known from the North. Up to the present *Loriculus exilis*, though allied to *L. flosculus* of Flores, is only known from the North, but we anticipate its discovery, or of a race of it, in the South.

On the other hand there are as well as *L. exilis* Schl. several peculiar species which occur in the North and not in the South, for instance, *Ninox ochracea* (Schl.), *Strix inexpectata* Schl., *Meropogon forsteni* Bp., *Lyncornis macropterus* Bp., *Pitta forsteni* Bp., *Myza sarasinorum* M. & Wg., *Enodes erythrophrys* (Temm.), *Carpophaga poecilorrhoa* Brügg., *Gymnocrex rosenbergi* (Schl.), *Aramidopsis plateni* W. Blas., *Megacephalon maleo* (Hartl.) and others, besides such migratory species as only touch the North. It must, however, be taken into consideration that it is more than probable that at least some of these species will still be found in the South, which is much less thoroughly explored than the North, and the Centre is almost unknown. Conclusions, therefore, cannot be drawn from these data.

That there are a number of forms differing specifically or subspecifically in the North and South Peninsulas will appear from the pages of our book. These representative forms are:

North Peninsula	South Peninsula
Spilospizias trinotatus (typical)	*S. trinotatus haesitandus*
Trichoglossus meyeri (typical)	*T. meyeri bonthainensis*
Microstictus fulvus	*M. wallacei*
Phoenicophaes calorhynchus (typical) . .	*P. calorhynchus meridionalis*
Monachalcyon monachus	*M. capucinus*
Stoparola septentrionalis	*S. meridionalis*
Pachycephala sulfuriventer	*P. meridionalis*
Pachycephala bonensis	*P. bonthaina*
Edoliisoma morio septentrionalis	*E. morio* (typical)
Cyrtostomus frenatus > *saleyerensis* . . .	*C. frenatus* < *saleyerensis*
Hermotimia grayi	*H. porphyrolaema*
Melilestes celebensis (typical)	*M. celebensis meridionalis*
Malia grata recondita	*M. grata* (typical)
Trichostoma celebense	*T. finschi*
Streptocitta torquata	*S. albicollis*
Oriolus celebensis (typical)	*O. celebensis meridionalis*
Ptilopus fischeri	*P. meridionalis*
Phlogoenas tristigmata	*P. bimaculata*

When it is remembered that the distance from the extreme ends of the North and South Peninsulas is between 800 and 900 miles and that the interior is in most parts very mountainous, the difference in the birds of the North and South need not cause surprise, since isolation, one of the essential conditions for the origin of a new species or subspecies, can occur here very readily.

There are differences of other kinds in other classes of animals in the North and South, but as the fauna of Celebes is so insufficiently known, the cases cannot yet be grouped together from a more general stand-point. We may mention, however, that Prof. v. Martens showed (in Weber's Zool. Ergebn. 1891 II, 259), that of the 64 land-shells known from Celebes only 2 are doubtless identical in the North and South, while 23 occur only in the North and 21 only in the South-west, etc. Among the Land Planarians collected by Dr. P. & Dr. F. Sarasin (Verh. D. Zool. Ges. 1897, 114), Prof v. Graff found that in North Celebes the Oriental, in South Celebes the Australian character prevails. It may be added that Prof. Wichmann (Tijdsch. K. Nederl. Aardr. Gen. 2. ser. 1890 VII, 978, and Petermann's Mitth. 1893, 281) surmises that during the second half of the Tertiary age single parts of South Celebes were raised as islands above the surface of the sea and only later, when the whole of it was upheaved, became united with Central Celebes as one land. Whether certain differences in the fauna of North and South Celebes may be explained hereby, we leave over to future decision. That, for instance, the Moleo of the North does not occur in the South is no zoological proof of former geological conditions, for as a rule animals have a restricted distribution.

The result of our study of the birds of Celebes, as well as of those of the countries around, is that by its Avifauna Celebes has far stronger connections with the Philippines than with any of the other neighbouring lands, and that the relation of its birds with the Oriental Region is more than twice as strong as with the Australian Region.

The line between Celebes and Borneo, though not that between Bali and Lombok, no doubt represents a conspicuous faunistic frontier, which remains unaltered even if the oldest continental frontier in earlier times was more to the east, but this line between Celebes and Borneo has not the fundamental significance which is still attributed to it by many writers. Even to-day the broad strait is nearly bridged over by shallows between South Celebes and Borneo (see map I). The line is not the western frontier of the Australian Region. The origin of the Celebesian Avifauna is principally an Asiatic one, but Celebes as a whole, or as a group of islands, was separated early from the continent, or never was intimately connected with it; its Avifauna, therefore, remained poor and must be pronounced an impoverished Asiatic one, but in consequence of isolation, peculiar forms were developed. The Papuan elements in it can be simply explained in view of the geographical position by the dispersal of birds through flight. This agrees very well with the results arrived at by Prof. Weber and Prof. v. Martens and others (see above pp. *85*, *87* et seq.).

The special faunas of Celebes, however, and of all islands of the East Indian Archipelago are far from worked out and we shall not live to see this. It will be the labour of a century and more. The future, therefore, only can decide, whether the ornithological facts as at present known teach us correctly that Celebes belongs to the Oriental Region and not to the Australian, and that it is most appropriate and safe to adopt a Transition-Zone between these two Regions, comprising a Celebesian Area, besides severally a Philippine, a Moluccan and a Lesser Sundan Area, of which the Celebesian has been treated of as to its Avifauna in our present essay.

After all we have not been able to discover anything very extraordinary about the birds of the island of Celebes. Its most striking feature is not that it has so many highly peculiar forms, but so extremely few. It has nothing among its birds to compare with a Dodo, or a Kiwi; it has not even a single peculiar avian family; only a few well marked peculiar genera, a large number of well characterized species belonging to genera not peculiar to the island, a still larger number of less well characterized species, local races or "subspecies", others which only very close observers believe they can discriminate; while the rest are by common consent termed absolutely identical with the individuals of their kind in the neighbouring lands. Islands like New Caledonia and Fiji have in proportion to their size quite as much that is peculiar about them, as has Celebes. The chief interest in the latter depends upon its intermediate position between Asia and Australia, the faunas of which are so vastly different.

SYSTEMATIC PART.

ORDER ACCIPITRES.

The diurnal Birds of Prey: Hawks, Eagles, Falcons, the Osprey, Vultures; distinguishable by the rigid, hooked, and sharply pointed bill; powerful, hooked claws; three toes in front and the fourth behind (except in the Osprey, in which the outer toe is reversible); usually of great powers of flight; 11 primaries; plumage often varied in coloration, but of sober tints: brown, black, white, grey, rufous, and purplish being found, but pure yellow, blue, red, bright green, and metallic tints are wanting. The *Accipitres* usually build a nest of sticks; the eggs are white or whitish in ground-colour, in many genera very handsomely varied with markings of rufous or brown; the young are hatched helpless and clothed with down.

FAMILY FALCONIDAE.

Containing all the Birds of Prey, except the Osprey (which is distinguished from them by its having the outer toe reversible and pterylologically by its having no aftershaft to the feathers) and the Vultures (which have the head and neck bare, or clothed in down).

GENUS SPILORNIS G. R. Gray.

Birds of Prey of medium size (about as large as a Raven), stout and compact in form, wings moderate; bill not denticulate; a broad nuchal crest; tarsi naked (except the upper fourth anteriorly), reticulated with hexagonal scales; toes short; under parts marked with transverse spots or bars of white; food: chiefly reptiles and amphibians; number of eggs laid: one or two. The genus contains about 12 species of a local and stationary character, distributed from the Himalayas and South China to the Andaman Islands, Celebes and Sula.

* 1. SPILORNIS RUFIPECTUS J. Gd.[1])

Russet-breasted Serpent-harrier.

Under this specific name we include two well-pronounced geographical races, *1. the typical Spilornis rufipectus* of the mainland of Celebes, *2. Spilornis rufipectus*

[1]) The abbreviation of the author's name at the head of each article is taken from the Berlin "Liste der Autoren" (1896), though the form adopted does not always meet with our approval.

sulaensis of the Sula group, and *3.* the individuals inhabiting the Peling group, which are intermediate between these two races. For the treatment of this, and of similar cases, the following method of nomenclature may be adopted without prejudice to ornithology.

1. The typical Spilornis rufipectus.

a. **Spilornis rufipectus** *(1)* Gould, P. Z. S. 1857, 222; *(II)* id., B. Asia, I pl. IX (1860); *(3)* Wall., P. Z. S. 1862, 338, pt.; *(4)* id., Ibis 1868, 16, 21; *(5)* Wald., Tr. Z. S. 1872, VIII, 35; *(6)* Sharpe, Cat. B. I, 1874, 291; *(7)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 643; *(8)* Brügg., Abh. Ver. Bremen 1876, V, 46; *(9)* Gurney, Ibis 1878, 96, 102; *(10)* W. Blas., J. f. O. 1883, 135; *(11)* Gurney, List Diurn. B. of Prey 1884, 17; *(12)* W. Blas., J. f. O. 1885, 403; *(13)* id., Ztschr. ges. Orn. 1885, 222; *(14)* Guillem., P. Z. S. 1885, 544; *(15)* Hickson, Nat. in N. Celebes 1889, 89; *(XVI)* Meyer, Vogelskel. II 1892, 27, t. CLVII; *(17)* Bütt., Zool. Erg. Webers Reise 1893 III, 271; *(18)* Sharpe, Ibis 1893, 552; *(19)* M. & Wg., Abh. Mus. Dresd. 1895 no. 8, p. 3; *(20)* iid., ib. 1896 no. 1, p. 7; *(21)* iid., ib. 1896, no. 2, p. 7; *(22)* Hartert, Nov. Zool. 1896, 161; *(23)* id., ib. 1897, 159.

b. **Circaetus bacha celebensis** *(1)* Schl., Mus. P.-B. Buteones 1862, 27; *(2)* Rosenb., Malay. Archip. 1878, 271.

c. **Circaetus rufipectus** *(1)* Schl., Valkv. Ned. Ind. 1866, 37, 72, pl. 23, figs. 1—3; *(2)* Gray, HL. 1869, I, 15; *(3)* Schl., Rev. Accip. 1873, 114.

"Kokodschi", Tjamba, S. Celebes, Platen *a 13.*
"Berna" (albescent young), Tjamba, Platen *a 13.*
"Bulièa-mohengo", Gorontalo Distr., N. Celebes, v. Rosenberg *b 2.*
"Kiokkiok", near Manado, Nat. Coll. in Dresd. Mus.
"Boina", Balante, E. Celebes, Nat. Coll.
"Sikep utang besar", Lembeh Id., Nat. Coll.

Figures and descriptions. Gould *II. 1*; Schlegel *c I*; Meyer *XVI* (skeleton); Sharpe *6.*

Diagnosis of race. Wing relatively longer than in *S. rufipectus sulaensis* (see, table of measurements), remiges below greyish white, broadly tipped and barred with blackish. These bars coalesce on the secondaries and base of primaries, enclosing spots of white, mottled with brown.

Old female. Upper surface dark brown, glossed with purple; sides and top of head, crest, and throat black, ear-coverts washed with grey; hind neck dusky, the margins of the feathers here and there, and on the crest, fulvous brown; secondaries and some of the upper tail-coverts tipped with white; carpal edge spotted with white; tail above pale brown, tipped with whitish, and crossed with four broad black bands — the basal one rather indistinct; breast mummy-brown; remaining under-parts — including under wing- and tail-coverts — darker, the lower breast spotted, the sides, abdomen, thighs and under tail-coverts closely barred with white; under side of wing broadly barred and spotted with white (Manado, Nr. 6682).

Younger female. Like the above, but the brown of the upper plumage paler and duller without so much purple gloss; hind neck pale brown, without (or with only a few) yellow-brown margins here and on the crest, the black feathers of which are more or less broken up with yellowish white; tail crossed with three black bands, the

basal one indistinct; breast much paler and more of a dark wood-brown tone (S. Celebes: Platen — C 10707).

Male. Similar to the female, but the white bars of the under parts more sharply defined and extending further towards the breast (whereas in the female they form sooner into disconnected spots); the brown bars on the under tail-coverts narrower (♂ vix ad. S. Celebes — Platen, C 10708; 3 ♂♂ ad. & vix ad. Sarasin Coll., N. & S. Celebes).

"Iris gold-yellow; periocular skin and cere green-yellow; bill blue-black; feet lemon- (or gold-) yellow" in both sexes (Platen *a 13*).

Female in albescent immature plumage. Head, crest and neck fulvous white with dark brown shaft-streaks; the upper parts display a varied plumage of sepia and fulvous brown, the feathers in general having dark centres and pale bases and margins; primaries and secondaries tipped with white; tail pale brown above, white below, and crossed with 5 to 6 indistinct dark bands, tip white; whole of under surface buffy white, streaked from the breast downwards with dark brown, which often spreads out in a washy manner in lighter brown over much of the feather. In this specimen the cross-barred feathers of maturity are sprouting at the flanks (S. Celebes — Nr. 6683).

A male in albescent plumage recently obtained by the Drs. Sarasin at Kema, Aug. 5th, 1893, corresponds with the above description of the female; ear-coverts and subocular region black; under surface purer white, with fewer and smaller brown streaks, here and on the upper surface not showing a general wash of rufous apparent on comparison in the other specimen. "Iris yellow; legs and feet yellowish grey; bill black, at the base blue" (Sarasin). A second male is much more rufo-fulvous in general tint than the other (Macassar, 12. IX. 95: Sarasin Coll.).

A specimen in the Leyden Museum (N. Celebes — Faber, 1883) is half in albescent plumage, half in adult. Wings and tail as in albescent specimens; under wing-coverts white, some tipped with rufous brown; back, breast, abdomen and thighs much as in ♀ ad.

First plumage. The full-fledged young of this species is not known, but in the cases of *Spilornis bacha* (Java), *S. cheela* (India) and *S. spilogaster* (Ceylon), young birds of each in the first stage of dress have been described or figured (Schlegel, Valkv. N. I. pl. 22, f. 3; Sharpe, Cat. B. I, 287; Legge, B. Ceylon 1880, 62; Bernstein, J. f. O. 1860, 425), from which it will be seen that the first plumage often — perhaps always — much resembles that of full maturity. Whether young birds always assume this mature-looking dress on first leaving the nest, and then lose it and put on the immature albescent plumage, and finally recover the adult type of coloration, or, whether the members of the genus are dimorphous when young — both mature-plumaged and albescent individuals existing from the nest, — are questions upon which opinion is divided, and facts, unfortunately, are as yet insufficient to allow of their being answered. The albescent type of immature plumage probably occurs in all species of the genus. Specimens in this dress are figured by Schlegel in the cases of *S. bacha*, *S. rufipectus* and *S. sulaensis* (*b I*; *c I*; Schl., Valkv. pl. 22, f. 3); similar immature birds of *S. davisoni* Hume, *S. rutherfordi* Swinh. and *S. cheela* Lath. have been described (Hume, Str. F. II, 148; Bingham, ib. IX, 144; Oates, B. Brit. Burmah, II, 194; Sharpe, Cat. B. I, 287), and there is a ♀ specimen of *S. holospilus* Vigors from Mindanao in this plumage in the Dresden Museum (Nr. 13822). Gurney considered this to be the second plumage *(8)*, Schlegel and Colonel Legge express the opinion that it is a more or less frequent variation of

dress assumed in the nest itself. Longitudinal streaks on the feathers of birds appear to represent a more original, less highly differentiated plumage than do cross-bars; this is shown by the fact that almost all birds of prey, which when adult acquire a cross-barred under-side, have this region streaked or drop-marked when immature.

If Gurney's view, that the pale, streaked specimens of *Spilornis* are in the second plumage, be correct, the curious case would be seen of a species regularly reverting from a higher stage of dress to a lower one and, subsequently, re-acquiring the more highly differentiated coloration.

As pointing to the probability that both albescent, streaked individuals and also dark, spotted ones exist from the nest in the case of *Spilornis*, Colonel Legge points out that of the Booted Eagle *(Nisaetus pennatus)* both dark and light young ones have been taken out of the same nest; but the case is not strictly a parallel to that of *Spilornis*, inasmuch as *N. pennatus* has two different phases of adult dress, a light and a dark one, and, when dimorphous pairs of young ones have been found, they are said to be sprung from a light male and dark female, or vice-versa (B. Ceylon, 62).

The albescent plumage is found in both sexes.

Skeleton.

Length of cranium	77.5 mm	Length of fibula	84.0 mm
Greatest breadth of cranium	42.0 »	» » tarso-metatarsus	76.0 »
Length of humerus	97.0 »	» » sternum	61.0 »
» » ulna	110.0 »	Greatest breadth of sternum	35.5 »
» » radius	105.0 »	Height of crista sterni	13.5 »
» » manus	87.0 »	Length of pelvis	72.0 »
» » femur	65.0 »	Greatest breadth of pelvis	31.5 »
» » tibia	105.5 »		

(Siao, Sangi in Mus. Berol. XVII.)

Nidification. Unknown.

Distribution. Celebes. South Peninsula (Wallace *a 1*, Guillemard *a 14*, Platen *a 13*, Weber *a 17*, *etc.*); Central Celebes — Luwu Distr. (Weber *a 17*, P. & F. Sarasin *a 20*); S.E. Peninsula — Kendari (Beccari *a 7*); E. Peninsula (Nat. Coll. *a 21*); N. Peninsula (Forster *b 1*, v. Duivenbode *c 3*, *etc.*); Talissi Id. (Hickson *a 15*); Lembeh Id. (Nat. Coll. in Dresd. Mus.); Siao — known only from skeleton (Meyer *a XVI*).

+2. Spilornis rufipectus sulaensis (Schl.).

d. **Circaetus sulaensis** *(1)* Schl., Valkv. Ned. Ind. 1866, 38, 72, pl. 23, figs. 4—6; *(2)* Gray, HL. 1869 I, 15.

e. **Spilornis sulaensis** *(1)* Wall. Ibis 1868, 16; *(2)* Sharpe, Cat. B. 1874, I, 292; *(3)* Gurney, Ibis 1878, 102; *(4)* id. Diurn. B. of Prey 1884, 17; *(5)* Sharpe, Ibis 1893, 552.

f. **Circaetus rufipectus sulaensis** *(1)* Schl., Mus. P.-B. Rev. Accip. 1873, 114.

Figures and descriptions. Schlegel *d I*; Sharpe *e 2*.

Diagnosis. Wing relatively shorter than in the *typical S. rufipectus* (see table); under-side of quills greyish white, passing into blackish at the distal ends, and crossed by three or four well-marked bars of blackish, much narrower than those of the typical form. These bars do not coalesce on the basal half of the quills in the same manner as in that form, but pass separately across the wing.

Distribution. Sula Islands, Sula Besi and Sula Mangoli (Allen *d 1*, Bernstein & Hoedt *c I*, *e 1*).

In the Leyden Museum are seven specimens — 3 ♂ ad., 3 ♀ ad. and 1 ♀ juv. albescent — from Sula. The males have the breast paler; on the lower breast and

abdomen the white bars are broader and the brown ones narrower, and the barring on the lower breast is better defined than in the other sex; under tail-coverts white (in one specimen slightly barred towards the tip). The females of Sula have the under tail-coverts barred and in regard to the barring of the under surface would appear to resemble the males of Celebes, but there are only one or two males with the sex satisfactorily ascertained in the Leyden Museum for comparison. The female of Celebes is more spotted below.

3. Spilornis rufipectus < sulaensis. [1])

g. **Spilornis sulaensis** *(1)* M. & Wg., Abh. Mus. Dresden 1896 no. 2, p. 7.

"Alaji Kabut", Peling; **"Alaji"**, Banggai, Nat. Coll.

Diagnosis. Intermediate between the *typical S. rufipectus* and *S. rufipectus sulaensis*, but on the whole more like the latter race.

Distribution. Peling group between Sula and E. Celebes: — Peling and Banggai (Nat. Coll.).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
(Nr. 6682) [♀] North Celebes	370-5	250	79	28
(Nr. 2199) [♀] North Celebes	340-4	250	74	26
(*C* 846) [♀] N. Celebes, March 1871 (Meyer)	360	240	75	—
(*C* 10844) [♀] N. Celebes, Aug.—Sept. 92 (Nat. Coll.)	344	230	74	27
(*C* 10845) [♀] N. Celebes, Aug.—Sept. 92 (Nat. Coll.)	353	236	74	27.5
(Sarasin Coll.) ♂, N. Celebes, 20. Oct. 93 (P. & F. S.)	340	230	78	25.5
(Sarasin Coll.) ♂, N. Celebes, 6. Oct. 94 (P. & F. S.)	342	242	78	27
(Sarasin Coll.) ♂ juv., N. Celebes, 5. Aug. 93 (P. & F. S.)	337	230	73	27
(*C* 14247) [♂] Lembeh Id. March 95 (Nat. Coll.)	337	218	73	25
(*C* 10708) ♂, South Celebes, 6. May 78 (Platen)	330	215	75	28
(*C* 10707) ♂, South Celebes, 12. March 78 (Platen)	325	220	73	27.5
(Schlüter Coll.) ♀, South Celebes (Platen)	344	229	72	—
(Sarasin Coll.) ♂, South Celebes, 21. Sept. 95 (P. & F. S.)	322	223	74	29
(Sarasin Coll.) ♂ juv., S. Celebes, 12. Sept. 95 (P. & F. S.)	332	232	70	26
(Sarasin Coll.) ♀, Centr. C., Palopo, 21. Jan. 95 (P. & F. S.)	328	—	72	28
(*C* 14295) [♀], East Celebes, May-Aug. 95 (Nat. Coll.)	363	236	78	—
(Norwich Mus.) ad. Macassar (Wallace) (Communicated by Mr. Gurney:)	345	—	71	—
(Norwich Mus.) ♂ ad. Macassar (Wallace) (Communicated by Mr. Gurney:)	345	—	71	—
(Norwich Mus.) ♂ ad. Macassar (Wallace) (Communicated by Mr. Gurney:)	338	—	69	—
(Norwich Mus.) ad. Macassar (Wallace) (Communicated by Mr. Gurney:)	345	—	76	—
(Norwich Mus.) imm. N. Celebes (Meyer) (Communicated by Mr. Gurney:)	345	—	71	—
(Norwich Mus.) vix ad. N. Celebes (Whitely) (Communicated by Mr. Gurney:)	355	—	76	—
5 adults, Peling Id., V—VIII. 95 (Nat. Coll.)	312-38	—	—	—
4 adults, 2 juv. Banggai Id., VI. 95 (Nat. Coll.)	305-25	—	—	—
(Norwich Mus.) ♂, Sula Islands	314	221	73	27
(Norwich Mus.) ♀ juv., Sula Islands	305	220	72	26

[1]) As will be found more fully explained under the *heading: Haliastur indus*, a long connecting hyphen (*e. g. S. rufipectus — sulaensis*) is used in this work to indicate the connecting forms between subspecies; or, where it may be safely said that such individuals have stronger leanings to one subspecies than to the other, the sign > or <, respectively (*S. rufipectus > sulaensis*) indicating that the affinities are more with the typical form, or (*S. rufipectus < sulaensis*) with the latter form.

The fine series of this Serpent-harrier before us displays great variation in tint; on the breast, for instance, from pale russet to dark Vandyck-brown. The darkest examples are probably the oldest. The specimens from North Celebes are, with one exception, darker than those of the southern peninsula, and Mr. Gurney writes that the specimen from Kema (N. Celebes) in the Norwich Museum "is decidedly darker than our four from Macassar, especially on the breast". Two in the Leyden Museum from Pare-Pare near Macassar do not appear to differ from those of the north, and Mr. Hartert remarks *(a 22)* of some fresh specimens from the southern peninsula in the Tring Museum that the breast is much paler in some examples, darker in others. None of the southern examples before us appear to be old birds. The birds from Peling and Banggai vary in the same way, — one is Vandyck-brown on the breast, most of the others much paler.

Outside the Celebes Province a very near ally of *S. rufipectus* is found in Dr. Sharpe's recently described *Spilornis raja* (Bull. B. O. C. 1893, no. X; Ibis 1893, 552, 569), a specimen of which was sent by Mr. Edward Bartlett from Kuching, Sarawak. This is said to be most like the Sula race, but differs in having the white bars of the breast, abdomen and axillaries strikingly narrower. From Sharpe's measurements it would appear to have the wing of the Sula form (viz. 309 mm), but a shorter tail (178 mm).

The food of Serpent-harriers consists chiefly of frogs, snakes and other Reptilia. The Indian species lay one or two eggs; most usually only one.

The genus *Spilornis* is an important one in questions of geographical distribution. Owing to the small number of eggs laid, the species do not suffer from overcrowding; and there appear to be no causes for its ever shifting its quarters. The genus is a purely Indian one, and is not found further east than the Sula Islands; and the close connection of these islands with Celebes is shown by the fact of their possessing the same species, which also — if identical — occurs on Siao in the Sangi Islands.

Attention might here be called to the close similarity of the plumage of *Circus assimilis* Jard. & Selby to certain species of this genus, especially *Spilornis holospilus* Vig. of the Philippines.[1]) Mimicry is here out of the question, as *C. assimilis* does not occur in the Philippines, and the similarity must be taken as pointing to kinship of the two genera (see below under *Circus assimilis* and *Pernis celebensis*).

GENUS CIRCUS Lac.

The Harriers are of slender form, with very long wings, tail, and tarsus, and somewhat short and not powerful toes. A more or less well developed facial ruff extending from behind the ear-coverts across the throat:

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[1]) Cf. also *Spilornis panayensis* Steere (List B. Philip. Is. 1890 p. 7).

bill somewhat weak, with a blunt festoon: tarsi naked (except at the top anteriorly), clad in front with transverse shields, elsewhere with small reticulate scales. Food: amphibians, reptiles, small mammals, etc. Eggs 2—4 in number. About 18 species, migratory and stationary, distributed over the greater part of the world.

+ 2. CIRCUS ASSIMILIS Jard. Selby.

Allied Harrier.

Circus assimilis *(1)* Jard. & Selby, Ill. Orn. 1826, I, pl. 51 type examd.[1]); *(2)* Schl., Mus. P.-B. Circi, 1862, 9; *(III)* id., Valkv. 1866, 29, 66, pl. 20, f. 2, 3; *(4)* Walden, Tr. Z. S. 1872, VIII, 37; *(5)* Sharpe, Cat. B. 1874, I, 63; *(6)* Gurney, Ibis, 1875, 225; *(7)* id., Diurn. B. of Prey, 1884, 23; *(8)* W. Blas., Ztschr. Ges. Orn. 1885, 205, 234; *(9)* North, Nests & Eggs B. Austr. 1889, 1, pl. II, f. 4 (egg); *(10)* Büttik., Webers Reise in Ost-Ind. 1893 III, 272; *(11)* M. & Wg., Abh. Mus. Dresden 1896 no. 1, p. 7; *(12)* Hartert, Nov. Zool. 1896, 163.

a. **Circus jardinii** Gld., P. Z. S. 1837, 141; *(1)* id., B. Austr. 1848, I, pl. 27; *(2)* S. Müll., Reizen Ind. Arch. 1857, II, 8; *(3)* Gld., Handb. B. Austr. 1865, I, 60; *(4)* Schl., Rev. Acc. 1873, 50.

b. **Spilocircus jardinii** *(1)* Kaup, Isis, 1847, 102.

c. **Strigiceps jardinii** *(1)* Bp., Consp. 1850, I, 34.

"Bokan buri", S. Celebes, Platen *8.*

For further references see Sharpe *5.*

Figures and descriptions. Jardine & Selby *I*; Gould *a I*, *a 3*; Schlegel *III*; North *9* (egg); Kaup *b I*; Sharpe *5*; W. Blas. *8.*

Male, nearly adult. General colour above brownish ash, darker on head; forehead, ear-coverts and crown with rufous margins to the feathers; secondaries pure ashy, banded with dark brown — indistinctly on the inner web; wing-coverts, scapulars and upper tail-coverts marked with short bars or large spots of white, which are more indistinct and ashy on exposed parts of the plumage; shoulder rufous; tail above ashy, below white, crossed with seven bars of blackish and terminally margined with white; under surface — including under wing- and tail-coverts and thighs — cinnamon-rufous, lighter on the thighs and abdomen, and spangled all over with white spots arranged two and two at short intervals on the opposite webs of the feathers. "Iris sulphur-yellow; cere and bill bluish grey (cere pale yellow — Wallace); tip of bill black; feet citron-yellow" (Platen). Nr. 6735, Tjamba, May).

Old. Crown of head, cheeks and ear-coverts tawny-rufous, with blackish mesial streaks to the feathers (♂, Lake Posso, 14. Feb. 95, P. & F. Sarasin).

Female. Like the male, but larger.

Young. Above brown with fulvous margins to the feathers; upper tail-coverts white washed with rufous and having dark brown centres; tail sepia-brown tipped with

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[1]) The type of *Circus assimilis J. & S.* in the British Museum is immature and not normal, differing from all other specimens there of this species in the coloration of the wings and tail. The tail is nearly uniform brownish ashy with a rufous wash at its sides, marked with 3 or 4 imperfect bars of brown towards the base, followed by a clear space, with an imperfect terminal bar. Upper tail-coverts white, a few of the longer ones with a bar of brown towards the tip.

tawny-buff and crossed with six bands of black; below pale tawny-buff, lightest on abdomen and thighs, and streaked with dark brown on breast and under tail-coverts (ex Sharpe).

Eggs. 2 or 3, white, with a bluish green tinge on the inner surface; 51—52 × 38—39 mm (Australia — A. J. North *9*). Uniform white, a little smaller than those of *C. rufus* of Europe: 49—51 × 39—39 mm: Nehrkorn, MS.).

Nest. Flat, of small sticks and twigs, lined with green leaves; usually placed among the thick branches of a low tree (Australia).

Breeding-time in Australia. Sept.—Nov.

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (Sarasin Coll.) ♂ ad. Lake Posso, Central Celebes, 14. II. 95 (P. & F. S.)	375	235	84	20
b. (C 10709) ♂ vix ad. S. Celebes, 16. IV. 78 (Platen)	390	260	93	19
c. (C 10710) ♀ vix ad. S. Celebes, 25. V. 78 (Platen)	425	275	98	20.5
d. (Nr. 6735) ♂, S. Celebes, 6. V. 78 (Platen)	385	250	93	—
e. (C 11293) [♀] New South Wales	435	280	101	21
f. (C 11092) [♀] juv. Australia	437	280	107	22

Distribution. N. Celebes—Minahassa (Riedel *b 4*), Gorontalo District (Forsten *2*, Rosenberg *b 4*), Central Celebes (P. & F. Sarasin *11*), S. Celebes (S. Müller *2*, *b 2*, Weber *10*, Platen *8*, Everett *12*); Australia—apparently throughout (Ramsay *9*); Tasmania (Norwich Mus. *6*).

This well-marked Harrier is remarkable for its distribution, occurring, as it does, in Celebes and Australia and, so far as is yet known, on none of the intervening islands. To the north and west of Celebes, the Chinese *Circus spilonotus* Kaup is found in the Philippines and Borneo, and, according to Mr. Everett and Mr. Whitehead (J. Straits Br. R. A. S. 1889, 180; Ibis, 1890, 43), this species is "a regular winter migrant" to Borneo and Palawan. East of Celebes, a Harrier (*C. spilothorax*, Salvad. & D'Alb.) has been discovered at Yule Island in the Papuan Gulf, South New Guinea, corresponding closely in coloration with *C. maillardi* Verr. (*C. macrocelis* Newton) of Madagascar and Réunion and with *C. wolfi* Gurney and *C. gouldi* Bp. of New Caledonia and Australia, respectively (Salvad., Orn. Pap. I, 71); but neither this species, nor *C. spilonotus*, have anything to do with *C. assimilis*.

The similarity of the adult plumage of this Harrier to that of certain species of *Spilornis* is worthy of notice. The type of coloration may be ancient. It should be remarked that Gurney, whose arrangement of the *Falconidae* we follow, places the subfamily *Circinae* much nearer to the *Circaetinae* (containing *Spilornis*) than has been the custom with most other authors *(7)*.

C. assimilis is, we believe, a stationary species in Celebes, though we have only been able to collect the following few dates of occurrence there ranging from February to November:

a. Macassar	♀	juv.	March	*(2)*
b. Tjamba	♂	nearly ad.	April 16th	*(7, C 10709)*
c. Tjamba	♂	nearly ad.	May 6th	*(Nr. 6735)*
d. Tjamba	♀	nearly ad.	May 25th	*(7, C 10710)*
e. Gorontalo	♂	ad.	June 8th	*(a 4)*
f. Gorontalo	♂	ad.	July 16th	*(a 4)*
g. Ayer-Pannas	♀		August 18th	*(a 4)*
h. Bone	♀	ad.	Nov. 23rd	*(a 4)*
i. Bone	♀		Nov. 23rd	*(a 4)*
j. Lake Posso	♂	ad.	Febr. 14th	*(11)*

Mr. Everett *(12)* obtained six specimens between Sept. 16 and November.

If stationary, differences might be expected to have arisen between Celebesian and Australian birds; nevertheless the numerous specimens in the British and Leyden Museums appear to be quite similar.

When at Macassar, Salomon Müller observed that this Harrier "flies like the Harriers of the northern quarters of the globe, haunts open fields and meadows and settles in the same manner by preference silently and unnoticed upon the ground, or on a stone, or a low pole, or the like, where, for its own security and for watching for its prey, it gets a wide view" *(a 2)*.

GENUS ASTUR Lac.

The Goshawks range in size from medium to small (Kestrel-size); stout, compact birds; wings rather short, reaching to about the middle of the tail; tomia with a blunt festoon; tarsi stout, feathered on their upper half (except posteriorly), the lower half clad with transverse shields anteriorly, elsewhere irregularly scaled; toes stout, the middle one not exceptionally prolonged. Food: any land-vertebrates weaker than the bird itself. Eggs 2—-4. The genus is found in most parts of the five continents and Australia, but authors are not agreed as to its systematic limits. There are migratory and stationary forms.

†* 3. ASTUR GRISEICEPS Schl.

Grey-headed Goshawk.

a. **Falco griseiceps** [Temm. in Mus. Leyden].

Astur griseiceps *(1)* Schl., Mus. P.-B. Astures, 1862, 23; *(II)* Wall., Ibis, 1864, 184, pl. V; *(3)* Finsch, Neu-Guinea 1865, 155; *(IV)* Schl., Valkv. 1866, 19, 58, pl. 11, f. 1, 2; *(5)* Wall., Ibis, 1868, 6, 20; Gray, HL. 1869, I, 30; *(6)* Schl., Rev. Acc. 1873, 66; *(7)* Sharpe, Cat. B. 1874, I, 106; *(8)* Brüggem., Abh. Ver. Bremen 1876, V, 43; *(9)* M. & Wg., Abh. Mus. Dresden 1895 Nr. 8, p. 3; *(10)* iid., ib. 1896, Nr. 1, pp. 4, 7; *(11)* Hart., Nov. Zool. 1897, 165.

b. **Lophospiza griseiceps** *(1)* Kaup, P. Z. S. 1867, 178; *(2)* Walden, Tr. Z. S. 1872, VIII, 33; *(3)* Lenz, J. f. O. 1877, 365; *(4)* Meyer, Ibis 1879, 55; *(5)* W. Blas., J. f. O. 1883, 134; *(6)* id., Ztschr. ges. Orn. 1885, 221.

c. **Lophospizias griseiceps** *(1)* Gurney, Ibis 1875, 355; *(2)* Salvad., Orn. Pap. 1880, I, 67; Gurney, Diurn. B. of Prey 1884, 29.

"Rurunbalu", Tjamba, S. Celebes, Platen *b 4.*

"Sikep burik sedang", juv. Manado, Nat. Coll.

Figures and descriptions. Wall. *II*; Schl. *IV, 1, 6*; Sharpe *7*; Brüggem. *8*; W. Blas. *b 6.*

Adult male. Head, neck, cheeks and ear-coverts blue-grey, shafts of the feathers dark; rest of upper surface, including primaries, warm (Prout's) brown with a purple gloss in certain lights; upper tail-coverts washed with slaty; tail crossed with four bands of blackish, the basal one concealed and imperfect; chin and throat white, bounded on either side by a malar streak of slaty black and marked down the middle with a stripe of the same colour; underparts white, uniform on the lower abdomen and under tail-coverts, but marked on breast, sides and abdomen with broad longitudinal streaks of blackish brown, and closely barred on thighs and flanks with blackish; under wing-coverts white; quills below white, at distal ends brown, and imperfectly crossed with about four narrow bars of dusky (♂, Rurukan, N. Celebes: April 1894: P. & F. Sarasin).

Adult female. Much like the male, but larger; the head browner grey, upper surface paler brown; the white of the under surface more tinged with buff, and the longitudinal stripes thereon warm dark brown (Prout's); the dusky bars on the thighs and flanks broader; five bars (instead of four) generally distinguishable on the tail — the two basal ones more or less obliterated and concealed; under wing-coverts white, with a few brown spots on them — sometimes also seen in the male (♀ ad., Kema, N. Celebes, 30th Aug. 1893: P. & F. Sarasin).

"Iris gold-yellow; feet yellow; cere greenish yellow; bill grey-blue" (♀ — Sarasin).

Young. Above warm dark brown, with whitish terminal edges to the feathers, the middle and lateral parts of the feathers more buff-brown; head above blacker brown, with whitish tips; face and under surface white, sometimes almost unstriped with brown, usually striped with dark brown, chiefly along the mesial part of the feathers of the breast, and stained (as it appears) with a weak solution of the same brown chiefly on the face and breast; the thighs with dark transverse spots and bars; 5—6 dark bars on the tail, basally indistinct (♀ juv., Lake Matanna, S. E. Central Celebes, 27. II. 96: P. & F. Sarasin; and other examples).

"Iris yellow; cere greenish; legs green-yellow, on the shins dark" (P. & F. S.).

Measurements.

	Wing	Tail	Tarsus	Culmen from cere
a. (Nr. 6701) ad. Minahassa, N. Cel. (v. Musschenbroek)	206	180	56	—
b. (Nr. 6703) [♂] ad. Gorontalo, N. Cel. (Riedel) . . .	183	157	49	—
c. (Sarasin Coll.) ♀ ad. Kema, N. Cel., 30. VIII. 93 .	200	160	54	18
d. (Sarasin Coll.) ♀ ad. Tomohon, N. Cel., 2. VIII. 94	204	170	—	17.5
e. (Sarasin Coll.) ♂ ad. Rurukan, N. Cel., IV. 94 .	176	142	46	15
f. (Sarasin Coll.) ♂ ad. Lake Limbotto, N. Cel., 18. III. 95	181	141	—	16.5
g. (Sarasin Coll.) ♂ ad. Lake Towuti, S. E. Cel., 3. III. 96	182	142	—	14.5
h. (Sarasin Coll.) "♂" [? ♀] j. Mapane, C. Cel., 3. III. 95	200	168	—	17.5
i. (Sarasin Coll.) ♂ j. Lake Matanna, C. Cel., 27. II. 96	195	161	—	17
j. (*c* 10847) juv. Minahassa, VIII.-IX. 92 (Nat. Coll.) . .	203	164	54	18
k. (*c* 13454) juv. Minahassa, 15. VIII. 94 (Nat. Coll.) . .	200	165	—	16.5

In the case of the tarsus, on account of the difficulty of measuring this part in many birds of prey, the figures given should be taken only as approximate.

Distribution. Celebes. S. Peninsula (Wallace *5*, Platen *b 4*), S. E. Central Celebes, Lakes Matanna and Towuti (P. & F. Sarasin); Dongala, W. Celebes (Doherty *11*); N. Central Celebes, Mapane (P. & F. Sarasin); N. Peninsula, Minahassa (Wallace *5*; etc.), Gorontalo Distr. (Forsten *1*, etc. *6*, *8*).

Ceram was also put down as a locality for this species in 1865 by Dr. Finsch *(3)*, but it is now evident that this is an error.

This small Goshawk was discovered about fifty years ago by Forsten. Its range is not known to extend beyond the mainland of the island, where it seems to be not uncommon, though specimens are not abundant in European Museums. Professor W. Blasius *(b 3)* was able to examine 21 skins collected by van Duivenbode's hunters in North Celebes. A nice series of three adult males, two adult females, and two young specimens were obtained in North and Central Celebes by the cousins Sarasin, and these, combined with the specimens in the Dresden Museum, enable us to say with safety that the species does not vary locally to any appreciable degree, if at all, and also to point out the difference between the sexes.

Nothing has been recorded of the habits of this Goshawk. It is most nearly related to the next species, *Astur trivirgatus* (Temm.) which differs by having the breast rufous-brown, or striped with rufous-brown, as against the long blackish or blackish brown stripes in the present bird.

4. ASTUR TRIVIRGATUS (Temm.).

Crested Goshawk.

This species is composed of the two following subspecies:

+ 1. The typical Astur trivirgatus (Temm.)

a. **Falco trivirgatus** *(I)* Temm., Pl. Col. 1824, no. 303.

b. **Astur trivirgatus** Cuv., Règne An. 1829, pt. I, 332; *(1)* Jerd., B. Ind. 1862, I, 47 *(2)* Schl., Mus. P.-B. Astures, 1862, 22; *(III)* id., Valkv. 1866, 18, 57, pl. 10; *(4)* Swinh., Ibis, 1866, 395; Wall., Ibis 1868, 6; Schl., Rev. Acc. 1873, 65; *(5)* Sharpe, Cat. B. I 1874, 105 pt.; *(6)* Salvad. Ucc. di Borneo, 1874, 17; *(7)* Sharpe, Ibis, 1876, 32; *(8)* Hume, Str. F. 1879, VIII, 43; *(9)* Legge, B. Ceylon, 1880, 20; *(10)* Nicholson, Ibis, 1882, 52; *(11)* W. Blas., Verh. z. b. Ges. Wien, 1883, 21; *(12)* Oates, B. Brit. Burmah, 1883, II, 177 pt.; *(13)* Guillem., P. Z. S. 1885, 545; *(14)* Sharpe, Ibis, 1888, 195; *(15)* W. Blas., Ornis, 1888, 303; *(16)* Sharpe, Ibis, 1889, 67; id., ib. 1890, 274, pt.; *(17)* Everett, J. Str. Br. R. A. S. 1889, 180; *(18)* Steere, Coll. B. Philip. Is. 1890, 7; *(19)* Oates, Hume's Nests & Eggs, 1890, III, 119, pt.; *(20)* Vorderman, N. T. Ned. Ind. 1890, 379; *(21)* Hose, Ibis, 1893, 418; *(22)* Hartert, Ornis 1891, 122; *(23)* Bourns & Worces., B. Menage Exped. 1894, 32; *(24)* Everett, Ibis 1895, 31.

c. **Lophospiza trivirgatus** Kaup, Contr. Orn. 1850, 65; *(1)* David et Oust., Ois. Chine, 1877, 22; *(2)* Bourdillon, Str. F. 1880, IX, 299; *(3)* W. Blas., J. f. O. 1890, 144; *(4)* Hartert, Nov. Zool. 1895, 476.

d. **Lophospiza indica** *(1)* Hume (nec Hodgs.) Str. F. 1875, III, 24.

e. **Lophospizias trivirgatus** *(1)* Gurney, Ibis, 1875, 355; *(2)* id., Str. F. 1877, V, 502; *(3)* id., Diurn. B. of Prey, 1884, 29; *(4)* Blanf., Faun. Br. India B. 1895 III, 401.

f. **Lophospiza trivirgata** *(1)* Hume, Str. F. 1877, 8, 124.

g. **Astur (Lophospizia) trivirgatus** *(1)* Hartert, J. f. O. 1889, 375.

Figures and descriptions. Temminck *a I*; Schlegel *III*; Sharpe, *5*, *16*; Gurney *d 1*, *d 2*; Hume, *e 1*; Legge *9*; Oates *12*; W. Blasius *11*; Blanford *e 4*; d'Alton, Skel. d. Raubv. 1838, Taf. VI figs. *n*, *o* (Skull); Selenka, Bronn's Kl. u. Ord. VI. Abth. IV, pl. III fig. 6 (wing-bones).

Young. Above warm dark (Prout's) brown, the feathers furnished with small rufescent tips; head and crest blackish; ear-coverts and neck more rufescent; upper tail-coverts crossed with a blackish band and broadly tipped with white; tail — not fully grown — crossed with three black bands; below white, on the flanks and thighs barred and elsewhere marked with streaks and drops of brown; a dark streak down the middle of the throat (Java — Nr. 5692).

Adult. The upper plumage — brown in the young — becomes slaty grey with maturity, palest on head, browner on wings; tail crossed with four dark bands; throat as in the young; chest tawny-rufous; rest of under surface white, barred with rufous and brown, except on the under tail-coverts which are uniform. Bill black; iris orange-yellow; feet yellow.

"Iris light brown; bill black; tarsus yellow" *(a 13)*.

Measurements.

	Wing	Tail	Tarsus	Culmen
(*a* Nr. 5692) juv. Java	180	130	56	22
(Sharpe *3*) ♂ ad. (Java?)	198	160	56	—
(Gurney *5*) ♀ ad. Java	228	—	58	—

Distribution. Indian Peninsula (Hume *f 1*, Gurney *e 1*); Ceylon (Hume *f 1*, Legge *b 9*); Pegu (Oates *b 12*); Formosa (Swinh. *b 4*); Philippines (Gurney *e 1*, Platen *c 3*, Steere *b 18*); Palawan (Whitehead *b 14*, Platen *b 15*); Borneo (S. Müll. *b 2*, etc. *b 6*, *b 17*); Sumatra (S. Müll. *b 2*, Forbes *b 10*); Java (Boie, Bernst. *b 2*); North Celebes (Guillem. *b 13*).

2. Astur trivirgatus rufitinctus (McClell.).

h. **Spizaetus rufitinctus** *(1)* McClell., P. Z. S. 1839, 153.

i. **Astur trivirgatus** pt. *(1)* Sharpe, Cat. B. 1874, I, 105; *(2)* Oates, B. Brit. Burmah, 1883, II, 177 pt.; *(3)* Sharpe, Ibis, 1890, 274 pt.

j. **Lophospizias indicus** (? Hodgs.), *(1)* Gurney, Ibis, 1875, 355.

k. **Lophospiza indica** *(1)* Hume, Str. F. 1877, V, 8.

l. **Lophospiza rufitinctus** *(1)* Hume, Str. F. 1877, 124; *(2)* Hume & Davison, ib. 1878, VI, 7.

m. **Lophospizias rufitinctus** *(1)* Gurney, Str. F. 1877, V, 502.

n. **Astur rufitinctus** *(1)* Hume, Str. F. 1879, VIII, 152.

o. **Lophospizias trivirgatus subsp. rufitinctus** *(1)* Gurney. Diurn. B. of Prey, 1884, 29.

Diagnosis. Like the typical *A. trivirgatus*, but larger and more rufescent. Apparently a highland race. (See: Gurney *j 1*, Hume *k 1*, *l 1*).

Distribution. Himalayas from Nepaul to Assam, Cachar, Sylhet, Tipperah (Hume *k 1*, *l 1*); Nagpore, Bengal (Gurney *j 1*); Tenasserim (Davison *l 2*); Malay Peninsula (Blyth, Hume *n 1*).

Dr. Sharpe includes in the smaller race a young specimen obtained by Mr. Wallace in the Malay Peninsula *(b 5)*; and it is possible — judging from the length of wing — that Swinhoe's specimen from Formosa, though placed by Gurney in the smaller race, approaches more nearly to the larger Himalayan birds (*b 4*, *e 1*).

The right of this species to be included among the birds of Celebes rests upon a young specimen obtained at Likoupang, North Celebes, by Dr. Guillemard during the cruise of the "Marchesa".

In India two, or rather three, nests of this species have been found, from which it would appear that only two eggs are laid *(b 19)*. It is not surprising, therefore, to find a sufficient number of dates of occurrence in Borneo to show that the species is a resident there *(b 16*, *b 7*, *b 11)*. Its occurrence in Celebes is of interest, but, in consideration of the fact that this species is represented there already in a near relation, *A. griseiceps* Schl., it is more probable that it is a straggler from the north or west than a resident.

It differs from *A. griseiceps* by its brownish-rufous breast, or where the breast is white with stripes and spots thereon, by the brown-rufous tint of these markings, as against the blackish, or very dark brown, colour of the lengthy stripes of *A. griseiceps*; the claws also seem to be longer in the latter species.

The Crested Goshawk was found by Captain Legge to be very partial to lizards, while other authors note that it preys fiercely upon fowls, pigeons and other birds *(b 9)*.

For further references to literature on this species see: Sharpe *b 5*, Legge *b 9*, Oates *b 12*.

† 5. ? ASTUR TENUIROSTRIS Brügg.

Astur tenuirostris *(1)* Brüggem., Abh. Ver. Bremen 1876, V, 43.

a. **Urospiza iogaster** *(1)* W. Blas. (? nec S. Müll.), J. f. O. 1883, 151.

b. **Urospizias hiogaster** pt.? *(1)* Gurney, Diurn. B. of Prey 1884, 36.

Brüggemann described an example from Celebes from v. Rosenberg, without exact locality, as follows:

Young ♂. Bill somewhat thin, elongated; the ridge scarcely curved downwards at the base, almost straight, and not bent markedly till near the point; the projecting hook only slightly developed; edge of upper mandible along the gape straight, somewhat turned inwards about the middle, without any signs of a tooth, and with only a trace of a flat hollow before the point; feet and their covering as in *A. iogaster*: tarsi somewhat slender, feathered in front for about a third of their length, at the base

with overhanging feathers, behind with a double row of rather small, and for the most part multiangular, scales; toes middle-sized; claws relatively weak.

Entire upper surface uniform dark brown, passing into dark grey on the front and sides of the head; bases of the feathers white; lesser wing-coverts, tertiaries and points of the secondaries and rectrices furnished with rust-red edges; tail uniform dark brown, in certain lights with faint traces of narrow cross-bars [separated by intervals of about 10 mm]; inner webs of the quills and tail-feathers with moderately broad indistinct cross-bars of darker brown, more apparent near the rust-red margins and on the under side; under wing-coverts reddish white; outer quills below ashy grey, inner ones pale rust-reddish; tail-feathers below whitish grey, reddish at the edge of the inner web; body below white, with a rusty yellowish wash on the abdomen and thighs; feathers of the breast with dark brown shafts and with a rhombic, sharp-pointed, brown spot before the end; towards the belly these spots are arrow-shaped, and pass into rather broad and somewhat washy cross-bars on the sides of the body and thighs; lower abdomen, anal region, under tail-coverts and feathering of the tarsi unspotted. Wing 182 mm (when adult perhaps ca. 200), tail 115; culmen from forehead 23; height of bill at base 14.5, at front edge of cere 12; tarsus 53; middle toe 28 (Brüggemann).

Through the kindness of Professor von Koch we have been able to examine Brüggemann's type, a young specimen most nearly resembling, among other Celebean species, the young of *Astur trivirgatus* and *griseiceps*. From these species it differs by its more slender tarsus and toes, especially in this respect from *A. griseiceps*, and the character of the barring on the wings below and tail is quite different from both.

Professor W. Blasius *(a 1)* thinks it possible that this specimen is a young one of *A. hiogaster* or the young of a new species of Celebes, the adult of which has not yet been found. Jacquinot and Pucheran have already indicated Macassar as a haunt of *A. hiogaster*, but neither Walden, nor Salvadori, nor Blasius believe in the correctness of the locality noted for the specimen in question. It is not possible to form a positive opinion about it. If *A. tenuirostris* is the same as *Urospizias hiogaster* the following is the synonymy:

† **Urospizias hiogaster** (S. Müll.)

a. **Falco hiogaster** S. Müll., Verh. Nat. Geschied. 1839—44, 110.

b. **Epervier océanien** *(I)* Hombr. & Jacq., Voy. Pole Sud, Atl. pl. 2, f. 1.

c. **Accipiter hiogaster** Gray, Gen. B. 1845, I, 29.

d. **Nisus iogaster** *(1)* Schl., Mus. P.-B. Astures 1862, 43; *(II)* id., Valkv. 1866, 27, 65, pl. 18, f. 1, 2, 3; *(3)* id., Rev. Acc. 1873, 89.

e. **Erythrospiza iogaster** *(1)* Kaup, P. Z. S. 1867, 173.

f. **Erythrospiza iogastra** *(1)* Wald., Tr. Z. S. 1872, VIII, 34.

g. **Astur hiogaster** *(1)* Sharpe, Cat. B. 1874, I, 104; *(2)* id., Mitth. Mus. Dresd. 1878, 353, 355.

Urospizias hiogaster *(1)* Gurney, Ibis 1875, 365; id., Diurn. B. of Prey 1884, 36.

h. **Astur tenuirostris** *(1)* Brüggem., Abh. Ver. Bremen 1876, 43.

j. **Urospizias iogaster** *(1)* Salvad., Orn. Pap. 1880, I, 47; *(2)* W. Blas. & Nehrk., Verh. z.-b. Ges. Wien 1882, 413; *(3)* Salvad., Agg. Orn. Pap. 1889, 18.

k. **Urospiza iogaster** *(1)* W. Blas., J. f. O. 1883, 151.

For further synonyms and references see Salvadori *j 1.*

Figures and descriptions. Hombron & Jacquinot *b I*; Schlegel *d II*, *d 1*, *d 3*; Kaup *e 1*; Sharpe *g 1*, *g 2*; Salvadori *j 1*; W. Blasius & Nehrkorn *j 2.*

The absence of any exact locality for Brüggemann's *Astur tenuirostris* (the type-specimen now bears no original label at all) renders it impossible to decide at present whether *A. tenuirostris* is a new Celebesian species, or *A. hiogaster* in young plumage, or whether the bird is really an inhabitant of Celebes, or has been recorded from there owing to an erroneous label. Salvadori (O. P. I, 48) does not mention Celebes as a locality for *hiogaster*, and therefore does not acknowledge Jacquinot and Pucheran or express an opinion on *tenuirostris* Brüggem. It is a priori not altogether likely that *hiogaster* of Ceram and Amboina should occur in Celebes, especially as an ally of *hiogaster*, *A. pallidiceps* Salvad., belongs to the intermediate island of Buru, and it always remains surprising that no other traveller obtained the bird in Celebes. v. Rosenberg himself sent only one specimen of *hiogaster* from Amboina to the Leyden Museum.

GENUS UROSPIZIAS Kaup amended by Gurney.

Hawks of rather small size, in structure hardly differing from *Astur*; tail long, crossed with 8—24 bars (Kaup); tarsus rather long, the upper fourth feathered in front, toes moderate. About 20 local species, inhabiting Australia, Papuasia, the Moluccas, the Lesser Sunda Islands to Lombok, Polynesia as far as Fiji and the Mariannes.

+ 6. UROSPIZIAS TORQUATUS (Temm.).

Rufous-collared Hawk.

a. **Falco torquatus** "Cuv." *(I)* Temm., Pl. Col. Nrs. 43 ad., 93 juv. (1823).

b. **Nisus torquatus** *(1)* Schl., Mus. P.-B. Astures 1862, 39; *(II)* id., Valkv. Ned. Ind. 1866, 25, 63, pl. 17, figs. 1—5; *(3)* id., Rev. Accip. 1873, 91.

c. **Astur cruentus** *(1)* Gould, P. Z. S. 1842, 113; *(II)* id., B. Austr. 1848, I, pl. 18?; *(3)* id., HB. B. Austr. 1865, I, 43.

d. **Astur torquatus** *(1)* Sharpe, Cat. B. I, 1874, 125; *(2)* Hartert, Nov. Zool. 1896, 177.

Urospizias torquatus *(1)* Gurney, Ibis 1875, 365; *(2)* Salvad., Orn. Pap. I, 1880, 60, 549; *(3)* id., Ibis 1881, 606; *(4)* Gurney, Ibis 1881, 263—66; *(5)* id., Diurn. B. of Prey 1884, 37; *(6)* Salvad., Agg. Orn. Pap. 1889, 20; *(7)* Gurney jr., Ibis 1893, 349; *(8)* Salvad., Ann. Mus. Civ. Gen. 1896, XXXVI, 60.

For further synonymy and references cf. Salvadori *2*, *6*.

Figures and descriptions. Temminck *a I*; Schlegel *b II*; ? Gould *c II*; Sharpe *d 1*; Salvadori *2*.

Adult. Above brownish slate-grey, paler on ear-coverts; a broad collar of rufous on hind-neck and upper mantle; fore-neck and breast paler rufous, almost uniform on jugulum, but taking the form of narrow pale rufous bars on a whitish ground on breast, sides, abdomen and under wing-coverts; under tail-coverts whiter, thighs almost without bars; tail like the upper parts, below whitish grey, crossed with 10—12 almost obliterated dusky bars: wing 256 mm; tail 200; tarsus 61; middle toe with claw ca. 45; culmen from cere 20 (ad. Dammar Id., near Timor: Riedel — Nr. 6696).

Measurements. ♂ adult wing 195 mm, ♀ adult wing 230 mm (Hartert *d 2*).

Young. "Above brown; the feathers white at the base, some of this white being shown on the hind-neck; all feathers margined with rusty rufous; shoulders deep rufous. Underside white; chin, throat, and breast longitudinally striped with brown; abdomen with more rounded pale rufous spots. Thighs entirely rufous, the feathers with paler edges. Quills more distinctly barred than in adult birds" (Hartert *d 2*).

Distribution. Java?, Sumbawa, Flores, Samao, Timor, Babbar, N. & W. Australia, New Guinea, Waigiou, Batanta (cf. Schlegel *b 1*, *b 3*; Salvadori *2*, *6*). In the Celebesian Province — Djampea and Kalao Islands (Everett *d 2*).

In the above treatment of this species we have followed Count Salvadori, though it should be pointed out that the late J. H. Gurney, J. H. Gurney jun., and Dr. E. P. Ramsay hold a different opinion in regard to its distinctness in Australia and New Guinea. Temminck originally recorded its distribution as N. Australia, Timor, and the Moluccas. Several specimens were recently obtained by Mr. Everett in Djampea and Kalao between Flores and Celebes, and recorded by Mr. Hartert, hence the inclusion of the species in the Celebes list.

In Mus. P.-B. Astures, 1862, 42, Schlegel recorded under *Nisus cruentus* a ♂ ad. (Nr. 10) said to have been collected in Celebes by Reinwardt. Later (Rev. Acc. 1873, 88) it was included by him with 67 other specimens from various localities under the title *N. rufitorques*, but the locality, Celebes, was then cancelled and stated to be erroneous. This specimen is included by Count Salvadori in the synonymy of *A. griseigularis* of the Halmahera group.

An *Astur torquatus* labelled "?Celebes" is recorded by Mr. Hartert in his Katalog der Vög. Frankf. Mus. 1891, 180. As in the case of a specimen of *A. hiogaster* in the Dresden Museum similarly labelled "?Celebes", no authority is given for the locality, and both in all probability are incorrect.

GENUS TACHYSPIZIAS Kaup amended by Gurney.

A small migratory Hawk, in structure very like *Astur*; wing rather long and pointed, 3rd quill longest, from carpus to the tip of the secondaries only three-fifths of the length of the wing; bill moderate, tomia furnished with a large festoon or almost-semicircular tooth, cere very large, convex and bloated-looking; tarsi slender, upper fourth feathered anteriorly. Food:

insects; birds. Only one species, ranging from North China and Tenasserim east as far as Waigiou in Papuasia.

♄ 7. TACHYSPIZIAS SOLOENSIS (Horsf.).

Horsfield's Short-toed Hawk.

a. **Falco soloensis** Horsf., Tr. L. S. 1821, XIII, 137.

b. **Falco cuculoides** *(I)* Temm., Pl. Col. 1823, Nrs. 110, 129 (juv. et ad.).

c. **Astur soloensis** Less., Man. d'Orn. 1828, I, 94; *(I)* Sharpe, Cat. B. 1874, I, 114, pl. IV, f. 1.; *(2)* Hume & Davison, Str. F. 1878, VI, 8; *(3)* Bingham, Str. F. 1880, IX, 143; *(4)* Oates, B. Brit. Burmah 1883, II, 180; *(5)* Guillem, P. Z. S. 1885, 544; *(6)* Everett, J. Str. Br. R. A. S. 1889, 180; *(VI bis)* Murray, Avif. Brit. Ind. 1889, 20, fig.; *(7)* Sharpe, Ibis 1889, 68; 1890, 274; *(8)* Steere, Coll. B. Philip. 1890, 7, 5; *(9)* Styan, Ibis 1891, 488; *(10)* De la Touche, Ibis 1892, 410; *(11)* Blanf., Faun. Br. India, B. III, 1895, 400.

d. **Nisus minutus** Less.; *(1)* Pucher., Rev. Zool. 1850, 210.

e. **Nisus soloensis** Less., Tr. d'Orn. 1831, 60; *(1)* Schl., Mus. P.-B. Astures, 1862, 44; *(II)* id., Valkv. 1866, 28, 66, pl. 19, f. 4—6; *(3)* id., Rev. Acc. 1873, 97.

f. **Tachyspiza soloensis** *(1)* Kaup, Classif. Säug. u. Vög. 1844, 117; *(2)* id., P. Z. S. 1867, 169, 172; *(3)* Walden, Tr. Z. S. 1872, VIII, 110; *(4)* Meyer, Ibis 1879, 56.

g. **Micronisus soloensis** *(1)* Gray, List Acc. B. M. 1848, 75; *(2)* Swinh., P. Z. S. 1863, 261; *(3)* id., P. Z. S. 1871, 342; *(4)* Vorderman, N. T. Ned. Ind. 1891, 205; *(5)* id., ib. 1895, 318.

h. **Micronisus badius** Swinh. (nec Gm.), Ibis 1860, 359.

j. **Accipiter virgatus** Swinh. (nec Temm.), Ibis 1861, 264.

k. **Astur cuculoides** *(I)* Sharpe, Cat. B. 1874, I, 115, pl. IV, f. 2; *(2)* David & Oust. Ois. Chine 1877, 24; *(3)* Styan, Ibis 1891, 488; *(4)* id. Ibis 1893, 333.

Tachyspizias soloensis *(1)* Gurney, Ibis 1875, 365, 366; *(2)* Salvad, Orn. Pap. 1880, I, 65; *(3)* Gurney, Diurn. B. of Prey, 1884, 32; *(4)* Pleske, Bull. Ac. Sc. Petersb. 1884, 113; *(4a)* W. Blas., Ornis 1888, 544; *(5)* Salvad., Agg. Orn. Pap. 1889, 21; *(6)* M. & Wg., Abh. Mus. Dresden 1895 no. 8, p. 4; *(7)* iid., ib. 1895 Nr. 9, p. 1.

l. **Tachyspizias cuculoides** *(1)* Gurney, Ibis 1875, 366; *(2)* id. (? subsp.), Diurn. B. of Prey 1884, 32.

"Meo", Karkellang, Talaut Is., Nat. Coll.

"Sikep abu-abu mera", Minahassa, iid.

For further references see Salvadori *2*.

Figures and descriptions. Temminck *b I*; Schlegel *e II*, *e 1*, *e 3*; Sharpe *c I*, *k I*; Murray *c VI bis*; Kaup *f 1*, *f 2*; Pucheran *d 1*; Gurney *1*; Hume & Davison *2*; Bingham *c 3*; Salvadori *2*; Oates *c 4*; Vorderman *g 4*; Blanford *c 11*.

Adult "*Astur cuculoides*". Entire upper surface slate-grey with dark slate margins to the feathers, the unexposed basal part of the feathers white; wing-coverts and quills blacker; ear-coverts smoke-grey; breast pale vinaceous-cinnamon; abdomen and sides varied with grey which tends to form into bars; remaining under parts buffy white, the feathers on chin and throat having dark shaft-streaks; inner webs of secondaries and basal parts of the inner webs of primaries below pure white; distal ends of the latter black; tail below whitish, crossed with about six imperfect narrow dark bands. (Celebes: C 10480.)

A second specimen, moulting (male), is similar to that described; and a few brown feathers of immaturity among the scapulars and secondaries reveal the fact that the pale vinaceous under surface of this form (known as *T. cuculoides*) is not a result of age, but is assumed as the young dress is cast off. "Iris dark brown; cere orange; feet gold yellow" (♂, Kema, N. Celebes, 3. Oct. 93; P. & F. Sarasin).

Adult in more rufous plumage: "*Astur soloensis*". Similar to the first-described bird, but darker slaty above; the jugulum and breast rufous, obscurely barred, the bars becoming more distinct on the flanks (Main, N. Celebes, 28. Feb. 1894: Nat. Coll. C 13239).

A young specimen (moulting), assuming adult plumage of the rufous form, has the head, neck and mantle, and single feathers on the scapulars and lower back, dark slate; the wings (many remiges lost), tail, and other upper parts in the brown plumage of the young; the breast (adult) deep rufous (Manado tua Id., end of May, 1894: Nat. Coll. C 1335ɔ).

Young. Very different from the adult: above brown (instead of slaty), darkest on head; below white, broadly streaked on the breast with rufous, and barred on the abdomen, flanks and thighs with paler rufous.

A young specimen — ♀, Mindoro — kindly lent to us by Mr. Nehrkorn resembles Schlegel's figure *(e II)*, but the streaks on the breast are larger and broader; the upper surface more uniform; ear-coverts without any grey wash; head dark clove-brown — almost black.

Eggs. Similar to those of *Accipiter nisus*, white with a few dark brown convolutions and blots at the small end: 39 × 30 mm (Nehrkorn in litt.).

Measurements.	Wing	Tail	Tarsus	Culmen of cere
a. (C 10480) ad. Celebes.	198	130	45	13
b. (Nr. 6726) ? ad. Sangi.	198	132	44	13
c. (C 13753) ad. Talaut Is., Nov. 1894 Nat. Coll.	190	130	42	12.5
d. (C 13239) ad. Minahassa, Feb. 94 iid.	199	133	43	13.5
e. (C 13358) vix ad. Manado tua Id., May 94 iid.	—	133	44	13.5
f. (Sarasin Coll.) ♂ vix ad. Minahassa, 3. Oct. 93 (P. & F. S.)	190	126	43	12

Distribution. North China, Amoy, Foochow, Tientsin, Pescadores, etc. (Fortune *g 1*, Swinhoe *g 2*, *g 3*); Tenasserim (Davison *c 2*, Bingham *c 3*); Nicobar Islands; Malacca; Sumatra; Java; Philippines — Mindoro (Mus. Nehrkorn; Salvad. *2*; Schl. *e 1*, *e 3*); Palawan (Platen); Borneo (Mottley *2*, Ussher, Whitehead *c 6*, *c 7*); Talaut Islands — Karkellang (Nat. Coll.); Sangi (v. Rosenb., Hoedt *e 3*; Meyer); Siao (Hoedt *e 3*); Celebes — Northern Peninsula (Forsten *e 1*, Rosenb. *e 3*, Meyer *f 3*, *f 4*, Guillemard *c 5*); Sula Islands — Sula Besi (Bernst., Hoedt *e 3*); Halmahera; Ternate; Batchian; Morty; Gagie; ? New Guinea (Salvad. *2*); Waigiou (Platen *5*).

Some strong grounds have been given for separating *A. cuculoides* Temm. from *A. soloensis* Horsf. as a distinct species. Dr. R. B. Sharpe (*k I*) distinguishes *A. cuculoides* chiefly by its pale vinous under surface mixed with ashy, and pure white under wing-coverts, from *A. soloensis* in which these parts are vinous-chestnut and buffy white, respectively. The late J. H. Gurney *(1)* adds from information supplied by Swinhoe, in whose cabinet he was able to exa-

mine specimens, that the two forms lay eggs which differ remarkably, and that they have differently coloured irides. Nevertheless Gurney, at the time, was doubtful about their specific distinctness, and, in his "List of the Diurn. B. of Prey in Norwich Mus." p. 32, he only admits *A. cuculoides* as a questionably valid subspecies. It should be remembered, that both occur together in the same localities — China, Java (Dresd. Mus.), Celebes, and, that at one time Swinhoe was not quite sure of the correct nomenclature for *A. soloensis*, *A. virgatus* and *A. badius*, but on one or two occasions misemployed these names, whence it appears not unjustifiable to suppose that the eggs in the Swinhoe collection, referred to by Gurney as those of *A. soloensis* and *A. cuculoides*, were in reality those of *A. soloensis* and *A. virgatus*, especially as *A. cuculoides* is not mentioned by Swinhoe except in the synonymy of *A. soloensis (g 2)* and we are not aware that any fourth species, corresponding to it, was ever spoken of by him.

After examining the series of these forms (nearly 70 in all) in the British and Leyden Museums (where is the type of *T. cuculoides*), in addition to six at Dresden, we at first were of opinion that the pale, more uniform plumage of *T. cuculoides* represents the old *T. soloensis*, especially the old male, though there is one very pale specimen at Leyden marked ♀. There is a male in the British Museum, assuming the adult dress, which is of as dark a rufous on the breast as the female, viz. specimen "*i* ♂ ad. Pescadores (Swinhoe)" of Dr. Sharpe's Catalogue *(c I)* which retains some immature plumage; other specimens, mostly males, if sexed, in the Leyden Museum afford transitions between such and the type of *cuculoides*. But this supposition — that the pale vinous specimens are always old — is controverted by a specimen (♂) in the Sarasin Collection described above; it is in the pale plumage of *T. cuculoides*, but a few brown feathers not yet moulted show that it is only a second year's bird. The only conditions possible seem to be, therefore, either that *T. soloensis* and *cuculoides* are two distinct species, as Sharpe supposed, or that they form one species which varies a good deal in the intensity of the rufous on the breast and slaty on the back. The presence of intermediate specimens, the perfect agreement of the two forms in structure, and their occurrence in the same localities, are arguments against their being two species; we believe the other explanation to be the correct one.

Very little has been recorded of the habits of *A. soloensis*. Kaup, examining the peculiar formation of the bill, believed himself justified in pronouncing that its food, especially when it has young, would prove to consist only of insects *(f 2)*; in Celebes v. Rosenberg found it to be "ein Hauptinsectenvertilger" (Malay. Archip. 1878, 271). We cannot put much stress upon either of these two statements. The specimen obtained by Zelebor during the visit of the "Novara" to Kar Nicobar was shot, however, while it was unsuccessfully chasing an *Oriolus macrourus* (Novara-Reise, Vög. p. 12).

When a species is found to range far over a group of islands and yet develop no differences of coloration in the various localities, it is usually safe

to assume that it is migratory. In the present case, in the absence of any direct statements to this effect, the dates, which have been recorded by various authors, tend to show that, while the species breeds in China (Swinhoe), it descends in the cold season with the N. E. monsoon into the Malay Peninsula and the East Indian Archipelago and stays till the S. W. monsoon begins, — that is to say from September-October to March. We make this statement with some hesitation, inasmuch as it is certain that some specimens remain behind (though perhaps not south of the equator), a specimen in the Leyden Museum having been obtained in Morty Island by Bernstein on August 1st, 1861.

On the other hand, all the dates but one, which we have been able to find, point to its being a migratory species. Davison and Bingham speak of it as a rare straggler in Tenasserim, and a specimen given to Swinhoe by Captain Ebert flew on board ship off the Pescadores early in May, facts which also point to migration.

1.	♀	ad.	Amoy, China,	April 1867 (Swinhoe) Sharpe, *c I.*
2.	♀	ad.	Amoy, China,	April 1867 (Swinhoe) Sharpe, *c I.*
3.	♂		Ningpo,	22. May 1874 (Swinhoe) in Brit. Mus.
4.		?	N. China,	15. April 1884 (Fortune Coll.) in Brit. Mus.
5.	♀		Amoy,	20. April 1867 (Swinhoe) in Brit. Mus.
6.	♀		Amoy,	Sept. 1866 (Swinhoe) in Brit. Mus.
7.	♂	ad.	Pescadores,	April 1866 (Swinhoe) Sharpe *c I.*
8.		?	Pescadores,	May 1866 (Ebert) Swinhoe (? same as Nr. 3).
9.	♀		Thoungyeen, Tenasserim,	12. April 1880 (Bingham) in Brit. Mus.
10.	♂	juv.	Tenasserim,	1. Oct. 1875 (Hough) in Brit. Mus.
11.	♀	juv.	Nicobar Is.,	Dec. 1873 (Wimberley) in Brit. Mus.
12.		?	Nicobar Is.,	25. Feb. (Zelebor) Pelz, Novara, Vög. *12.*
13.	♀	juv.	Nicobar Is.,	31. Jan. 1874 (Wimberley) in Brit. Mus.
14.	♀	juv.	Salangore,	11. Nov. 1879 (Davison) in Brit. Mus.
15.	—	juv.	Malacca,	Feb. 1880 (Davison) in Brit. Mus.
16.	♂	ad.	Mindoro,	20. April 1890 (Platen) in Mus. Nehrk.
17.	♀	juv.	Mindoro,	9. Sept. 1890 (Platen) in Mus. Nehrk.
18.	—	ad.	Labuan,	Dec. 1889 (Everett) in Brit. Mus.
19.	—	juv.	Labuan,	Dec. 1889 (Everett) in Brit. Mus.
20.	—	juv.	Labuan,	Feb. 1883 (Everett) in Brit. Mus.
21.		?	Kini Balu, Borneo,	26. Feb. 1887 (Whitehead) Everett, *c 6.*
22.	—	ad.	Talaut Is.,	Nov. 1894 (Nat. Coll.)
23.	♀	ad.	Sangi,	3. Jan. 1866 (Hoedt) Schl. *e 3.*
24.	♀	juv.	Sangi,	24. Oct. 1864 (Rosenb.) Schl. *e 3.*
25.	♂	juv.	Sangi,	3. Nov. 1864 (Rosenb.) Schl. *e 3.*
26.	♂	ad.	Sangi,	Oct. 1865 (Hoedt) Schl. *e 3.*
27.	♂	ad.	Sangi,	Oct. 1865 (Hoedt) Schl. *e 3.*
28.	♀	ad.	Sangi,	Oct. 1865 (Hoedt) Schl. *e 3.*
29.	♂	juv.	Celebes,	22. Sept. 1863 (Rosenb.) Schl. *e 3.*
30.		?	Celebes,	Mch. 1871 (Meyer) *f 4.*
31.	—	imm.	Manado tua Id.,	May 1894 (Nat. Coll.).
32.	—	ad.	N. Celebes,	Feb. 1894 (Nat. Coll.).
33.	♂	vix ad.	N. Celebes,	3. Oct. 1893 (P. & F. Sarasin).

34.	♀ ad.	Sula,	Feb. 1864 (Bernst.) Schl. *e 3.*
35.	♀ juv.	Sula,	Dec. 1864 (Bernst.) Schl. *e 3.*
36.	♂ ad.	Morty,	1. Aug. 1861 (Bernst.) Schl. *e 3.*
37.	♂ ad.	Morty,	11. Dec. 1861 (Bernst.) Schl. *e 3.*
38.	♂ —	Ternate	28. Dec. 1879 (Fischer) Pleske, *4.*
39.	?	Ternate,	Dec. 1874 (Bruijn) Salvad. *2.*
40.	♀ ad.	Gagie,	14. Nov. 1864 (Bernst.) Schl. *e 3.*

Dr. Steere *(c 8)* obtained the species in Mindanao in October or December.

The apparent absence from South Celebes, though many specimens have been obtained in the north during our winter, is also indicative of migration.

GENUS SPILOSPIZIAS Salvad.

A small weak-winged Hawk, peculiar to Celebes, and easily recognisable there by the three rows of large, round spots of white on the tail. Point of wing very blunt, the 3rd and 6th primaries only about 4 mm shorter than the 4th and 5th, the secondaries relatively long, the distance from the carpus to the tip of the inner ones being about five-sixths the length of the wing; tail rounded and slightly decurved; tomia with a large festoon; cere small, short, and dark in colour; toes much as in *Tachyspizias*, but the anterior claws blunter and straighter; food unknown. Only one species, evidently strictly stationary, as it differs racially in North and South Celebes.

* 8. SPILOSPIZIAS TRINOTATUS (Bp.).

White-spot Hawk.

Plate I.

It is not surprising to find that this weak-winged Celebesian Hawk differs racially to some extent in the Northern and the Southern Peninsulas of the island. The two races are:

1. The typical Spilospizias trinotatus.

a. **Accipiter trinotatus** *(1)* Bp., Consp. 1850, I, 33 [ex Temm., MS.]; Strickl., Orn. Syn. 1855, 115; *(2)* Wall., Ibis 1868, 8 pt.; Gray, HL. 1869, I, 34.

b. **Astur trinotatus** Bp., Rev. Zool. 1850, 490; *(1)* Sharpe, Cat. B. 1874, I, 101, pt.; *(2)* Brüggem., Abh. Ver. Bremen 1876, V, 44; *(3)* Guillem., P. Z. S. 1885, 544.

c. **Sparvius trinotatus** Bp., Rev. Zool. 1854, 538.

d. **Nisus trinotatus** *(1)* Schl., Mus. P.-B. Astures, 1862, 45; *(II)* id., Valkv. 1866, 27, 65, pl. 19, f. 1—3; *(3)* id., Rev. Acc. 1873, 90.

e. **Erythrospiza trinotata** *(1)* Kaup, P. Z. S. 1867, 172; Walden, Tr. Z. S. 1872, VIII, 33; *(2)* Meyer, Ibis 1879, 55; *(3)* Hickson, Nat. in N. Celebes, 1889, 87.

f. **Erythrospizias trinotatus** *(1)* Gurney, Ibis 1875, 364; *(2)* id., Diurn. B. of Prey 1884, 32.

g. **Spilospiza trinotata** *(1)* Salvad., Ann. Mus. Civ. Gen. 1876, 643; W. Blas., J. f. O. 1883, 134.

h. **Spilospizias trinotatus** *(1)* Salvad., Orn. Pap. I, 1880, 47; *(2)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 4; *(3)* Hart., Nov. Zool. 1897.

"Sikip-batta-batta", Minahassa, Meyer *e 2*.
"Sikep abu-abu", Manado, Guillem. *b 3*.
"Sikep werreng selak", Alfurous, Minahassa (Nat. Coll.).

Figures and descriptions. Schlegel *d II, d 1, d 3*; Bonaparte *a 1*; Kaup *e 1*; Sharpe *b 1*; Gurney *f 1*; Brüggem. *b 2*,

Adult male. Above slate-grey, blacker on the upper tail-coverts; quills above blackish, notched on the inner webs towards the base of the feathers with white; wing below and under wing-coverts white, free end of wing below grey; tail black, marked on the inner webs of the feathers with three rows of large white spots, intervals of about 25 mm separating the rows; on the outer webs of the feathers almost obliterated brownish spots corresponding to the white ones are just discernible; tail narrowly tipped with white, mainly confined to the inner webs; ear-coverts smoke-grey, paler on chin and throat; below rufous vinaceous-cinnamon, paling into whitish on thighs, flanks and under tail-coverts (♂, Tomohon, Minahassa, 7. IV. 94: P. & F. Sarasin); bill and cere above the nostrils black; cheeks and orbits orange-yellow; feet deep orange-yellow; iris chrome-yellow (Wall. *2*).

Young. Head and neck dark brown with ferruginous borders to the feathers; entire upper surface dark cinnamon-rufous, tail varied with black — the rufous predominating on the outer webs, the black on the inner — and marked as in the adult with three rows of large white spots on the inner webs, and tipped on the inner webs with white; under surface fulvous white, marked with long stripes of blackish brown on the breast and sides, and with a narrow dark streak down the middle of the throat; under wing-coverts and base of wing fulvous white; quills below reddish, marked on inner webs towards the bases of the feathers with short bars of blackish not extending completely across the web. (Manado, Nr. 6733).

Changing plumage. Another specimen is in a stage midway between the above described young plumage and that of the adult: middle parts of upper surface slaty grey as in the adult, with some cinnamon-rufous tipped feathers about the occiput and mantle; first primary and one or two of the secondaries cinnamon-rufous, the rest dark slaty; shoulders and scapulars cinnamon-rufous varied with slaty; breast vinaceous-cinnamon varied with a few broad streaks of dark brown, particularly on the left side of the specimen (Tondano, Aug.—Sept. 1892: Nat. Coll. — C 10790).

A very similar example in process of assuming the adult dress is in the Sarasin Collection. (See plate). "Iris, malar skin, and feet yellow; bill black" (♂ imm., Kema, 31. July 1893).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (Nr. 8150) ♂ Manado	170	148	55	—
b. (Nr. 6731) ad. Manado	164	146	52	14
c. (Nr. 6732) ad. Manado	180	148	56	16
d. (c 10848) ad. Manado, Aug.—Sept. 92 (Nat. Coll.)	165	145	55	15
e. (c 10849) ad. Manado, Aug.—Sept. 92 (Nat. Coll.)	164	150	51	15
f. (c 10790) vix ad. Tondano, Aug.—Sept. 92 (Nat. Coll.)	172	150	52	14.5
g. (Nr. 6733) juv. Manado	160	138	49	13.5
h. (c 10850) juv. Manado, Aug.—Sept. 92 (Nat. Coll.)	164	144	51	15
i. (Sarasin Coll.) ♂ ad. Tomohon, N. Cel. 7. April 94	155	130	53	12.5
j. (Sarasin Coll.) ♀ ad. Masarang, N. Cel. 9. Oct. 94	166	141	54	14
k. (Sarasin Coll.) ♂ vix ad. Kema, N. Cel. 31. July 93	169	140	51	15
l. (Sarasin Coll.) ♂ juv. Kema, N. Cel. 13. Sept. 93	173	136	53	—

Distribution. Northern peninsula of Celebes: Minahassa (Wallace *a 2*, *b 1*, Rosenberg *d 3*, Meyer *e 2*, Beccari *g 1*, etc.), Gorontalo District (Forsten *d 1*), Talissi Island (Hickson *e 3*); Tawaya and Dongola, W. Celebes (Doherty *h 3*).

♂ 2. Spilospizias trinotatus haesitandus Hartert.

i. **Accipiter trinotatus** pt. *(1)* Wall., Ibis 1868, 8 (Macassar).

i. **Astur trinotatus** *(1)* Sharpe, Cat. B. 1874, I, 101, pt. (Macassar); *(2)* Büttik., Zool. Erg. Webers Reise 1893, III, 271 (Pare-Pare).

Spilospizias trinotatus haesitandus *(1)* Hartert, Nov. Zool. 1896, III, 162, *(2)* id., ib. 1897.

Diagnosis. Differs from the typical S. trinotatus of the N. Peninsula in having the abdomen paler, white for its greater part, the vent and under tail-coverts pure white, the thighs pure white or with a very faint rosy shade on their upper part only (Hartert *1*). In the typical form these parts are whitish, washed with pink buff.

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (C 15443) ♀ ad. (cotype) Indrulaman, S. Cel. Sept. 95 (Everett)	175	143	52	16

Distribution. Southern Peninsula, Celebes: Macassar (Wallace *i 1*, *j 1*), Pare-Pare (Weber *j 2*), Peak of Bonthain (Everett *1*), Doherty *k 2*.

The differences between this form and the northern birds are slight and apparently not always pronounced.

This little Celebesian Hawk, which Mr. Wallace speaks of as one of the most beautiful Hawks of the East, much resembles *Accipiter minullus* of South Africa in the unusual markings of the tail, but differs from it and other species in so far that it must be placed in a genus or, better, subgenus for itself. In 1867 Kaup made the genus *Erythrospiza* for this species and *A. hiogaster* and *griseigularis*, but later the two latter species were very properly removed by Gurney and *E. trinotatus* made the sole representative of the genus, the name of which he amended to *Erythrospizias*. Count Salvadori, almost simultaneously, pointed out that *Erythrospiza* had been employed already by Bonaparte for a Loxiine genus; and he advanced the name *Spilospiza*[1]) in its stead *(g 1)*. The original description of *Erythrospiza* as applying to *S. trinotatus* is imperfect and misleading; an analysis of the original description of the two genera *Erythrospiza* and *Teraspiza (= Accipiter)* shows that the only tangible means mentioned for distinguishing between the two forms consists in the statement that in *Teraspiza* the inner vanes of the first four primaries are emarginated, while in *Erythrospiza* the emarginations extend to the fifth; but even this does not hold good for *E. trinotatus* in which the emarginations are usually only slightly cut out on the second, third and fourth, and not at all on the fifth primary. *S. trinotatus* in reality differs markedly from *Teraspiza* — taking *T. rhodogaster* for comparison — in the rounded point of the wing, there being little difference

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[1]) We prefer *Spilospizias* to *Spilospiza*, as Gurney did for other accipitrine genera with names ending in spiza, because *σπίζα* means any small chirping bird, whereas *σπιζίας* is a falcon or sparrow-hawk. (*σπίλος* = spot.)

in length between the 3rd, 4th, 5th and 6th primaries; in the blunt, weak ends of these feathers, significant of quiet flight; in the rounded tail; in the relatively much shorter toes, especially the middle one; whereas *T. rhodogaster*, which cannot be separated from *Accipiter* (as likewise the other members of *Teraspiza*), has the point of the wing and the tips of the individual feathers sharpened, hard and strong; the 6th (about 12 mm) and succeeding primaries much shortened; the tail square; the toes — especially the middle one — lengthened. Doubtless the two birds differ much in habits.

From *Urospizias hiogaster* and *griseigularis* which were included in the same genus by Kaup, but removed by Gurney, *S. trinotatus* differs chiefly in its short, rounded and weak wings, its less massive beak, and in its curiously marked and weak tail-feathers. *Spilospizias* stands as a genus on a somewhat better footing than *Tachyspizias*, *Urospizias*, *Scelospizias* and others into which the great genus *Accipiter* with its eighty or ninety species has been split up. Whether it be advisable to recognize these small divisions at all is very doubtful, but if once the subdivision of *Accipiter* into *Accipiter* and *Astur* is made, the other subdivisions appear necessary. The student of general ornithology would do well, and be sufficiently within the bounds of accuracy in speaking of this great body of Hawks broadly under the generic name *Accipiter*. Although *Spilospizias* is an interesting Celebesian form, it cannot be looked upon as of equal importance with *Meropogon*, *Basileornis*, *Scissirostrum*, etc.

On the island of Talissi just off the Northeastern extremity of the Minahassa Dr. Hickson speaks of this Hawk as "a bird often seen on the orange trees and the higher branches of the trees in the mangrove swamps". Nothing is known with certainty about its breeding habits, but it is probable that it makes its nest in mountain districts, where the young birds remain until they have assumed the adult plumage. From December to March 1870-71 young birds were not met with by Meyer in the plains near Manado, and the natives asserted that they did not occur there; on the other hand, in June one or more young specimens were shot at a height of 2000 ft. near Kakas on Lake Tondano *(e 2)*. The Dresden Museum has, however, since received 3 young examples from the neighbourhood of Manado.

GENUS ACCIPITER Briss.

The Sparrow-hawks are of small size, distinguishable from *Astur*, etc. by their long slender toes, the middle one being especially prolonged, overreaching the others by the entire length of the claw or more; tarsus slender, rather long, the upper fourth feathered anteriorly; tomia festooned; wing rather short, secondaries reaching about three-fourths the length of the wing. Preys chiefly upon birds. Eggs 3—6. About 23 species, migratory and stationary, of almost cosmopolitan distribution.

* 9. ACCIPITER RHODOGASTER (Schl.).

Vinous-breasted Sparrow-hawk.

a. **Nisus virgatus rhodogaster** *(1)* Schl., Mus. P.-B. Astures, 1862, 32.

Accipiter rhodogaster *(1)* Gurney, Ibis 1863, 450; *(2)* Wall., ib. 1868, 7; Gray, HL. 1869, I, 33; *(3)* Sharpe, Cat. B. 1874, I, 145; *(4)* Gurney, Ibis 1875, 471, 484; *(5)* Brüggem., Abh. Ver. Bremen 1876, 45; *(6)* Gurney, Ibis 1882, 452; *(7)* id., Diurn. B. of Prey 1884, 39; *(8)* Guillem., P. Z. S. 1885, 545; *(9)* W. Blas., Ztschr. ges. Orn. 1886, 85; *(11)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8 p. 4; *(12)* iid., ib. 1896, Nr. 1, p. 4; *(13)* Hartert, Nov. Zool. 1896, 162; *(14)* id., ib. 1897.

b. **Nisus rhodogaster** *(1)* Schl., Valkv. 1866, 21, 60, pl. 12, f. 5, 6; *(2)* id., Rev. Acc. 1873, 76.

c. **Teraspiza rhodogaster** *(1)* Kaup, P. Z. S. 1867, 171.

d. **Teraspiza rhodogastra** *(1)* Walden, Tr. Z. S. 1872, VIII, 33, 109, pl. IX (♀ juv.); *(2)* Meyer, Ibis 1879, 55; *(3)* W. Blas., J. f. O. 1883, 134.

"Sikep werreng kokie", Alfurous, near Tondano, N. Celebes (Nat. Coll.).

Figures and descriptions. Schl., *b 1*, *b 2*; Walden *d 1*; Kaup *c 1*; Sharpe *3*; Gurney *4*, *6*.

Adult ♀. Above dark slate-grey, paler on the ear-coverts and sides of neck; wing-coverts blackish; quills and tail above browner, obscurely crossed with dark bars, these bars are very distinct below on a pale greyish brown ground, 7 or 8 in number on outermost rectrice, 4 or 5 on the middle feathers, and about 9 on the longest primary; under wing-coverts fulvous white mottled with grey; chin and throat greyish white; breast, sides and upper abdomen rufous-vinaceous-cinnamon; lower abdomen and thighs pale grey, slightly varied with rufous; crissum and under tail-coverts white. (♂ ad. Tomohon, N. Cel. 10. April 1894: Sarasin Coll.) "Bill black; cere dusky yellow; feet yellow; iris bright chrome-yellow" (Wallace).

The female is very much larger than the male; the upper parts are blackish slate, the under wing-coverts buff-white with blackish spots thereon, the bars on the tail plainer and more decided; in other respects like the male. ([♀] Manado: Meyer Nr. 6722).

Young. Kestrel-like. Above bright hazel-rufous, the quills and tail crossed with four bars, and the wing- and tail-coverts and back marked with large heart-shaped spots of black; head and neck dark brown with fine rufous margins to the feathers; below buffy white, finely streaked about the sides of the face and down the centre and sides of the throat with blackish, and broadly streaked with blackish brown on the remaining under parts (with the exception of the under tail-coverts); under wing-coverts deeper buff, the lowest row spotted with brown, which is present as a few fine streaks on some of the others; secondaries crossed with five dark bars, primaries with about seven. (N. Celebes: v. Musschenbroek Nr. 6721).

Measurements.	Wing	Tail	Tarsus	Bill from cere
a. (Nr. 6723) [♀] ad. N. Celebes (Riedel)	211	156	63	16
b. (Nr. 6722) [♀] ad. Manado, N. Cel. (Meyer) . . .	212	157	60	16
c. (Sarasin Coll.) [♀] juv. Kema, N. Cel. end Sept. 93	201	151	57	15
d. (C 10789) [♂] ad. Manado, VIII—IX. 92 (Nat. Coll.)	167	125	53	12
e. (Sarasin Coll.) ♂ ad. Mt. Soputan, N. Cel. 16. IV. 95	166	120	51	11.5
f. (Sarasin Coll.) ♂ ad. Tomohon, N. Cel. 10. IV. 94 .	161	116	51	11.5

(Measurements continued.)	Wing	Tail	Tarsus	Bill from cere
g. (Sarasin Coll.) ♂ vix ad. E. of Peak of Bonthain, c. 900 m. S. Cel. 25. X. 95	170	125	54	12.5
h. (Sarasin Coll.) ♂ juv. Tomohon, N. Cel. 3. X. 94 .	168	129	50	12.5
i. (Nr. 6721) [♂] juv. N. Celebes (v. Musschenbr.) . .	161	122	51.5	13

Distribution. Celebes: Minahassa (v. Rosenberg *b 2*, v. Duivenbode *b 2*, *d 3*, *etc.*), Gorontalo Distr. (Forsten *a 1*, Rosenberg *b 2*, Riedel *9*), Southern peninsula — Macassar (Wallace *2*, *3*, Everett *13*), Mt. Bonthain (P. & F. Sarasin, Everett *13*), Dongala, W. Celebes (Doherty *14*).

Nothing is known of the habits of this Hawk. It was made the type of Kaup's genus *Teraspiza*, but the distinguishing characters given are very slight and the differences not appreciable at first sight. How insufficient they are may be gathered from the fact that even Kaup failed to see that the allied *A. sulaensis*, of which he had a specimen, belonged to the same genus, and placed it in another (*Uraspiza* Kaup), though Schlegel would not allow it later even subspecific distinction from *A. rhodogaster (c 1, b 2)*. It is distinguishable from that slightly differentiated geographical species by the bars on the wing below being nearly twice as broad, and in the male they are noticeable down to the tip of the wing, whereas in the male of *A. sulaensis* the bars are quite obliterated on the free end of the wing for about 4 cm; the Sula form also seems to be smaller. It is interesting to find that a closely corresponding process of wing-differentiation and of size has occurred in the Celebesian and Sulan forms of *Spilornis* (cf. antea, pp. 2, 4). *Accipiter sulaensis* differs further by its vinous (not grey) ear-coverts.

The resemblance of this Sparrow-hawk to the White-spot Hawk, *Spilospizias trinotatus*, is very perfect, though the curious white spots on the tail of the latter, and the structural differences pointed out in our article (p. 24), at once serve to distinguish them. What is more remarkable is that the young, which are totally different from the parents, are closely similar in both species. Moreover, the young, especially at least that of *A. rhodogaster* (by reason of the plain bars on the wings and tail), are just like Kestrels! The young of birds by their first dress often seem to "throw back" to a distant ancestral form, but the indications generally seem as if obscured by superimposed influences inherited from the parents, and, when not so obscured, the question comes in, whether the similarity really has the meaning which one is prompted to attach to it.

* 10. ACCIPITER SULAENSIS (Schl.).

Sula Vinous-breasted Sparrow-hawk.

a. **Nisus sulaensis** *(1)* Schl., Valkv. 1866, 26, 64, pl. 16, f. 3, 4.

b. **Uraspiza sulaensis** *(1)* Kaup, P. Z. S. 1867, 176.

Accipiter sulaensis *(1)* Wall., Ibis, 1868, 10, 20; Gray, HL. 1869, I, 34; *(2)* Sharpe, Cat. B. 1874, I, 146; *(3)* Gurney, Ibis, 1875, 484; *(4)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 2, p. 7.

c. **Nisus rhodogaster** *(1)* Schl., Rev. Acc. 1873, 76 pt. (Sula).

d. **Urospizias sulaensis** *(1)* Salvad., Orn. Pap. 1880, I, 65.

e. **Accipiter sulaensis** subsp. Gurney, Diurn. B. of Prey 1884, 39.

"Alaji sasoko", Banggai Id., Nat. Coll.

Figures and descriptions. Schl. *a I, c 1*; Kaup *b 1*; Sharpe *2*.

Adult male. Similar to the adult male of *A. rhodogaster*, but the cheeks vinaceous-cinnamon with a grey shade (instead of dark grey), chin and throat whiter vinaceous, the dark bars on the wing below much narrower and absent on the distal 40 mm of the wing, no bars distinguishable on the outermost tail-feather, the others also more indistinct ([♂] ad. Banggai Id., V—VIII. 95, Nat. Coll. — C 14627).

Female. Very much larger than the male. Differs from the female of *A. rhodogaster* by having the bars on the wing and tail much narrower, those on the outermost tail-feather partly obliterated; cheeks vinaceous grey ([♀] ad. Peling Id. V—VIII. 95: Nat. Coll. — C 14502).

Immature. The under parts as in the adult male; above with the rufous, Kestrel-like plumage of the young, varied with the slate-grey feathers of the adult ([♂] Banggai, V—VIII. 95: Nat. Coll. — C 14626).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (C 14502) [♀] ad. Peling	185	135	56	15
b. (C 14627) [♂] ad. Banggai	160	118	48	13
c. (C 14626) [♂] imm. Banggai	—	115	49	13

Distribution. Sula and Peling groups: Sula Besi (Bernstein *a I, c 1, b 1*); Banggai (Nat. Coll.), Peling (Nat. Coll).

Schlegel did not admit the validity of this local species in 1873 *(c 2)*, but it was again upheld by Sharpe *(2)*, and after examining the type, we agree with the latter in holding the two forms distinct. It is a very rare species in collections. Gurney *(3)* once remarked that the type appeared to be the only specimen extant in any collection; there was, however, a second in Darmstadt *(b 1)*; five are now known. The young one discribed by Kaup at the same time as that of this species is probably either *A. rubricollis* Wall. or *A. hiogaster* S. Müll., as is pointed out by Schlegel *(c 1)* and Salvadori *(d 1)*. *A. sulaensis* varies geographically in Sula in the same manner as *Spilornis rufipectus sulaensis*.

11. ACCIPITER VIRGATUS (Temm.).

Jungle Sparrow-hawk.

This species apparently consists of the following subspecies:

1. The typical Accipiter virgatus.

a. **Falco virgatus** Temm., Pl. Col. 1823, Nr. 109 (Java).

See also: Schl., Valkv. Ned. Ind. 1866, 20, 59, pl. 12, f. 1—4; Sharpe, Str. F. 1879,

VIII, 440; Gurney, t. c. 443; Hume, Str. F. 1880, IX, 231; Legge, B. Ceylon, 1880, 26; Oates, B. Brit. Burmah, 1883, II, 182; Gurney, Diurn. B. of Prey, 1884, 39, 164—177; Blanford, Faun. Br. Ind., B. III 1895, 404; Grant, Ibis 1896, 104—109.

Diagnosis. Size small, breast in adult male rufous, in female browner, upper surface slaty (after Gurney).

Distribution: Java (type), Sumatra (Mus. Leyd.), Malay Peninsula, Burmah, India and the Himalayas (Hume), Ceylon (Legge).

2. Accipiter virgatus affinis (Hdgs.).

b. **Accipiter affinis** Hodgs. in Gray's Zool. Misc. 1844, 81.

c. **Accipiter virgatus** *(1)* Sharpe, Str. F. 1879, VIII, 440—442 pt. (larger race of inner Himalayas); *(2)* Gurney, t. c. 443; *(3)* Hartert, Nov. Zool. 1894, 482.

d. **Accipiter gularis** Hume (nec. T. & S.), Str. F. 1880, IX, 231; Oates, B. Brit. Burmah, 1883, II, 183, pt.

e. **Accipiter virgatus affinis** Gurney, Diurn. B. of Prey 1884, 39, 168—173.

Diagnosis. Size large, breast chocolate-brown rufous (after Gurney).

Distribution. Himalayas from Sikkim to Mussorie (Hume); Formosa! (Gurney—in migration?).

(3?). Accipiter virgatus manilensis (Meyen).

f. **Accipiter manillensis** *(1)* Meyen, Nova Acta Acad. Leop. 1834, XVI, Suppl. p. 69, pl. IX; *(2)* Grant, Ibis 1894, 503; *(3)* Grant, Ibis 1895, 438; *(4)* Bourns & Worces., B. Menage Exped. 1894, 32.

g. **Accipiter stevensoni** Tweed., P. Z. S. 1878, 938, pl. LVII.

h. **Accipiter virgatus manillensis** Gurney, Diurn. B. of Prey 1884, 40, 173—177.

Diagnosis. Size small, breast of adult female as rufous as in the male, above somewhat browner than the typical form.

Distribution. Philippine Islands: — Luzon (Meyen, W. Ramsay, Whitehead *f 2*), Mindanao (Everett).

† 4. Accipiter virgatus gularis (T. & S.).

i. **Astur (Nisus) gularis** *(1)* Temm. & Schl., Faun. Jap. Aves, 1845, 5, pl. II.

j. **Accipiter nisoides** *(1)* Blyth, J. A. S. B. 1847, XVI, 727, *(2)* id., Ibis 1865, 28; 1866, 240; 1870, 158; *(3)* Gurney, Diurn. B. of Prey 1884, 40, 165—177; *(4)* id., Ibis, 1887, 362; *(5)* Gigl. & Salvad., P.Z.S. 1887, 581; *(6)* De La Touche, Ibis 1892, 485.

k. **Accipiter stevensoni** *(1)* Gurney, Ibis 1863, 447, pl. XI; *(2)* Swinhoe, ib. 1874, 430; *(3)* Sharpe, Cat. B. 1874, I, 152 (note); *(4)* Gurney, Ibis 1875, 482; *(5)* Sharpe, Str. F. 1879, VIII, 442; *(6)* Gurney, Ibis 1880, 217; *(7)* Hume, Str. F. 1880, 109, 231; *(8)* Legge, B. Ceylon 1880, 29; *(9)* Oates, B. Brit. Burmah 1883, II, 183.

l. **Accipiter virgatus** *(1)* Sharpe, Cat. B. 1874, I, 150, partim; *(2)* David & Oust., Ois. Chine 1877, 26; *(3)* Styan, Ibis 1887, 233; *(4)* Sharpe, ib. 1889, 68; *(5)* Everett, J. Str. Br. R. A. S. 1889, 180; *(6)* Styan, Ibis, 1891, 326, 488; *(7)* Hose, Ibis 1893, 418; *(8)* Everett, Ibis 1895, 38; (?*9*) De La Touche, ib. 337.

m. **Accipiter gularis** *(1)* Gurney, Ibis, 1875, 481—484, pt.; *(2)* id. Str. F. 1879, VIII, 443; *(3)* Seebohm, B. Japan. Emp. 1890, 205; *(4)* id., Ibis 1893, 52; *(5)* Grant, Ibis

1896, 104; *(6)* Hartert, Nov. Zool. 1896, 177; *(7)* Blanf., Fauna Br. Ind. B. III, 1895, 405.

n. **?Teraspiza virgatus** *(1)* Wald., Tr. Z. S. 1875, IX, 141.

o. **?Accipiter stephensoni** *(1)* Kutter, J. f. O. 1883, 294.

Diagnosis. The barring on the under parts of the female continued up to the throat, while in the females of the *A. virgatus* group the chest is, on the whole, longitudinally marked and blotched, or nearly uniform in colour, in contrast to the barred breast and under parts; the ashy black line down the middle of the white throat very narrow, in *A. virgatus* much wider and more strongly marked. In *A. gularis* the fourth primary quill is considerably longer than the fifth, in *A. virgatus* only slightly longer. (Grant *m 5*). Sharpe says *A. gularis* has a shorter middle toe (c. 28 mm as against 30.5).

Distribution. Siberia and Mantchuria (David *l 2*); Corea (Prince of Savoy *j 5*); North China (David *l 2*, etc.); South China (Styan *l 3*, *l 6*, De La Touche *j 6*); Japan (Gurney *j 3*, Seeb. *m 3*); Philippines? (Meyer *n 1*, Gurney *j 3*); Cochin China (Gurney *j 3*); Natuna Islands (Conrad *m 2*); Malacca (Wallace *k 5*); Sumatra (Gurney *j 3*); Java (Gurney *j 3*); Timor (Wallace *k 5*); Palawan (Everett *l 8*); Borneo (Everett, Whitehead, Mottley *l 5*, *l 4*); North Celebes (Riedel in Petersb. Mus.); Djampea (Everett, fide Hartert *m 6*).

5. Accipiter virgatus rufotibialis (Sharpe).

p. **Accipiter rufotibialis** Sharpe, Ibis 1887, 437; id., ib. 1889, 68, pl. II; id., ib. 1890, 274; Everett, J. Str. Br. R. A. S. 1889, 181; Hose, Ibis 1893, 418.

Diagnosis. Under tail-coverts uniform chestnut, thighs chestnut.

Distribution. Mt. Kini Balu, Borneo (Whitehead).

The above subdivision of this troublesome and badly understood species is based chiefly upon the conclusions of Gurney, Hume, Sharpe and O. Grant, but it can only, we think, be regarded as a provisional one. In his elaborate and careful article on *A. virgatus (l 3)*, Gurney distinguished three forms of this species, viz: the typical one, *A. virgatus*, a large race of the Himalayas (*A. affinis* subsp.) and a third, differing in coloration, from the Philippines (*A. manilensis* subsp.). Gurney distinguishes these from the typical form as follows:

"The larger form *(affinis)* chiefly differs, as regards coloration, from the typical *A. virgatus* (the range of which is decidedly more southern, though both races inhabit the most northerly parts of India) in the bright rufous, which usually characterizes the under surface of the old males of *A. virgatus*, being replaced in those of the northern race by a non-rufous chocolate brown". "The nearly allied hawk of the Philippine Islands (*A. manilensis* subsp.) is remarkable for having the rufous colouring of the breast as strongly developed in the adult female as in the male, which I believe is never the case in the typical *A. virgatus*; and, in addition to this, it also differs from *A. virgatus* in the somewhat browner and less slaty tint of the upper surface, and in the dark gular stripe being, in some adult specimens, much less distinctly marked."

A fourth form, which we have termed *A. virgatus gularis* (T. & S.), is treated by Gurney as a distinct species — *A. nisoides* Blyth[1]). The means of distinguishing this form from the typical *A. virgatus* are not pointed out; Dr. R. B. Sharpe, however, considers it[2]) "a paler breasted form of *A. virgatus* with a shorter middle toe (28 mm as against 30.5 mm circa), the female being barred underneath with brown, but not with rufous. It ranges from China down the Malay Peninsula, to Java and Timor, visiting these localities in winter" *(k 5)*. Hume speaks of it as wanting the central gular stripe, but this does not always hold good, — at least for Chinese birds *(k 7)*. Mr. Ogilvie Grant *(m 5)* has quite recently re-investigated this species, arriving at much the same result as Mr. Gurney, and holding *A. gularis* for a good species. Whether treated as a species or a subspecies does not lessen the difficulty of determining it, and Grant's careful analysis seems to be applicable only to the old female. Mr. Hartert *(m 6)*, with Gurney's and Grant's results before him, found much difficulty in determining Everett's 3 examples from Djampea; the wing-formula and the markings on the breast did not correspond with Grant's diagnosis. When the migration of the subspecies is taken into consideration, it is probable rather that they were the *typical A. virgatus* than the East Asiatic form, *gularis*, which in conformity with many other migrants from the north might be expected not to travel so far south.

Dr. Sharpe's *A. rufotibialis* may be distinguished from the others by its red thighs.

Facts, as at present understood, appear to point to the circumstance that *A. virgatus* in the warmer parts of its distribution is stationary and has become modified there into several local races; in winter, however, these localities are invaded by quantities of individuals migrating southwards from China, Japan and probably elsewhere, where they have developed some racial differences, and which now become intermingled with the stationary races, and this circumstance makes a satisfactory understanding of the species hardly possible at the present day. In the spring the northern birds, apparently, separate themselves from their southern relations and proceed again to their breeding quarters in China and Japan. Had facts relating to these points been more plentiful when Gurney wrote, it is probable that he would have had reason to modify his views; facts, however, are still scanty. In North China, near Pekin, Abbé David says that the species arrives in spring in great numbers *(l 2)*; about the lower Yangtse Basin Mr. F. W. Styan marks it as a non-breeding species, which passes in migration, and mentions a pair of specimens taken at sea, between Shanghai and Nagasaki on 6th May *(l 6)*; in South China, Foochow, Mr. De La Touche notes it as occurring in spring and autumn *(j 6)*; in a note sent with a specimen from Kini Balu, Mr. Whitehead speaks of it as being evidently a migrant

1) Blyth's name was published in 1847, Temminck and Schlegel's Raptores of the Fauna Japonica, Aves, in 1845 (see Seebohm, B. Japan. Empire, 1890, 3); consequently these authors have the priority.

2) Under the name *A. stevensoni*.

to that mountain of North Borneo *(l 4)*; Gurney mentions a specimen captured at sea off the Natuna Islands on 14th November (not "Nantura" as Gurney writes, see *l 1*), and we cannot agree with him that it had "accidentally" wandered so far to the southward *(m 2)*; the same author elsewhere expresses the opinion that it may occur as "only a winter visitor to Java" (P. Z. S. 1878, 938), and Dr. Sharpe takes the same view. But, since other species, such as *Tachyspizias soloensis*, *Butastur indicus* and *Ninox scutulata japonica*, migrating southwards from China and Japan, appear to fix their winter limits in Borneo and North Celebes, going little south of the equator, it is desirable to ascertain whether the birds, which invade Java in our winter, are not wanderers from India and Tenasserim, making a movement similar to that which appears to take place with *Butastur liventer* of the same regions.

More inquiry should also be made as to whether the Philippine Islands are really inhabited by a stationary and distinguishable race, inasmuch as the few specimens known from those quarters appear to have been obtained during the time of the southern migration from China. Luzon, January; Guimaras, March (Meyer *n 1*); Mindanao, Dec. — April (Koch *o 1*); Mindanao — 4 specimens, April (Everett *j 3*); Luzon, 2 sometime between Jan. 1st and April 3rd (Whitehead *f 2*), 1 in winter, Luzon (Whitehead *f 3*).

A single specimen of *A. virgatus gularis* obtained in North Celebes (Gorontalo) by Dr. Riedel has been most kindly lent to us by Mr. Pleske; it is now preserved in the St. Petersburg Museum. It is a new addition to the avifauna of Celebes. Djampea Island, from where Mr. Hartert records three specimens, also falls within the Celebesian Province as defined in this book.

Appended is a general description of the species and of the above specimen from Celebes.

Figures and descriptions. Temminck & Schlegel *i 1*; Gurney *k 1*, *j 3*, *k 4*, *m 1*, *m 2*; Sharpe *l 1*, *k 5*; Hume *k 7*; David & Oust. *l 2*; Grant *m 5*; Blanford *m 7*.

Adult (general description). Above blackish slaty, ear-coverts and sides of neck greyer; tail ashy grey crossed with three or four bars of blackish; throat, abdomen and under tail-coverts white, the former marked with a dark mesial streak; rest of under surface vinous chestnut; under wing-coverts whitish marked with brown; wing below ashy crossed with blackish bars.

Measurements (from Grant *m 5* converted to mm).	Wing	Tail	Tarsus
Typical A. virgatus ♀	183	145	51
A. virgatus affinis ♀	203-221	168-180	55-56
A. virgatus gularis ♀	183-190	127-142	50-53
A. virgatus gularis ♂	157-167	114-119	41-47
A. virgatus manilensis ♀	175-178	137-140	52-53
A. virgatus manilensis ♂	152-155	122-124	51
A. virgatus rufotibialis	149-150	114-117	46

Young. A. virgatus gularis. Above a somewhat greyish dark brown, the nape a little varied with white, the hind neck with rufous; wing-coverts, secondaries and feathers of back terminally margined with rufous; tail hair-brown, crossed with four dark bars, the outer feathers with about eight; throat and under tail-coverts white, the former with a slight trace of a gular streak; remaining under surface white, marked with streaks of rufous brown on the breast, with heart-shaped spots and bars on the abdomen, sides, thighs and under wing-coverts (Celebes — Riedel, St. Petersburg Museum).

Wing 170 mm; tail 122; tarsus 45; middle toe 27 (without claw), culmen from cere 9. The young of *Accipiter rhodogaster* readily distinguishes itself from the young of *A. virgatus* by the hazel-rufous of its upper plumage, barred on the wings and tail and spotted on the back with black; also the middle toe (32 mm) and the beak (13 mm) are longer.

GENUS SPIZAETUS Vieill.

The Hawk-eagles are powerful birds of large-medium size (larger than a Raven); with or without a crest; wing somewhat short, secondaries long, from carpus to the tip of the secondaries about five-sixths of the length of the wing; tomia festooned; tarsus completely feathered down to the base of the toes; toes somewhat short; claws large, strongly hooked, the hinder one nearly half as long again as the toe-joint. The species of the genus are stationary, about ten in number, found in the Oriental Region as far as Celebes, Africa, Central and South America. They prey upon large birds, mammals, lizards, and lay one or two eggs.

+*12. SPIZAETUS LANCEOLATUS Temm. & Schl.

Celebesian Hawk-eagle.

Plates II and III.

Spizaetus lanceolatus *(1)* Temm. & Schl. (Celebes tantum), Faun. Jap. Aves 1845, 8; *(2)* Bp., Consp. 1850, I, 29 partim; *(3)* Wall., Ibis 1868, 13; *(4)* Pelz., Verh. z.-b. Ges. Wien 1872, 426 (Aru!); *(5)* Sharpe, Cat. B. 1874, I, 270; W. Blas., J. f. O. 1883, 134; *(6)* id., Ztschr. ges. Orn. 1886, 195; *(7)* Büttik., Zool. Erg. Webers Reise in Ost-Ind. 1893, III, 272; *(8)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 4; *(9)* iid., ib. 1896, Nr. 1, p. 7.

b. **Spizaetus cirratus** part. *(1)* Schl., Mus. P.-B. Astures 1862, 9 (Celebes); *(II)* id., Valkv. Ned. Ind. 1866, 16, 55, pl. 7, f. 2 (Celebes) et f. 3 (Sula); *(3)* id., Rev. Accip. 1873, 57 (Celebes, Sula); Rosenb., Malay. Arch. 1878, 271.

c. **Spizaetus fasciolatus** "Temm." (err.) Schl., Astures 1862, 9; id., Valkv. 1866, 53; id., Rev. Accip. 1873, 58.

d. **Limnaetus lanceolatus** Gray, HL. 1869, I, 13, pt.; *(1)* Wald., Tr. Z. S. 1872, VIII, 34, 110; Gurney, Ibis 1877, 424; *(2)* Meyer, Ibis 1879, 56; *(3)* Salvad., Orn. Pap. 1880, I, 5; Gurney, Diurn. B. of Prey 1884, 49; Guillem., P. Z. S. 1885, 545.

"Bakatoa", Tjamba, S. Celebes (Platen in Dresd. Mns.).
"Koheba burik", Banka Id., N. Cel. (Nat. Coll.).
"Kiokkiok"[1]), Manado (Nat. Coll. in Mus. Dresd.).

Figures and descriptions. Schlegel *b II, b 3*; Walden *d 1*; Sharpe *5*; W. Blasius *6*.

Adult male. Head and neck blackish brown, the bases of the feathers white, the margins and sub-basal part of the feathers of the neck and sides of the head broadly washed with cinnamon, giving a streaked appearance to these parts; back and wings sepia glossed with purple, darkest on the mantle and shoulders; lower back paler; upper tail-coverts narrowly tipped with whitish; tail whitish brown, slightly mottled and washed with darker shades and crossed with four bands of blackish brown, a broad space (about 45 mm) separating the two endmost ones; throat white, with a black stripe down the middle[2]) of it and at the sides (sub-malar stripe); breast and sides pale brownish rufous marked with broad drop-shaped spots of black and, towards the abdomen, irregularly with white ones; remaining under parts white, closely barred with brown, of a rufous tinge on the abdomen and blacker as well as more closely barred on the legs; under wing-coverts white, thickly spotted and barred with dark brown; quills below white varied with grey, brown towards the distal ends, and with more or less perfect remains of about five dark cross-bars, which are also perceptible on the upper side on the inner webs. "Iris gold-yellow; cere blue-grey; bill black; feet citron-yellow. Length 550 mm; expanse 1160." (♂, Tjamba, S. Celebes: Platen — Nr. 6670).

Adult female measured by Dr. R. B. Sharpe has: wing 376; tail 274; tarsus 82.5 (? 92.5); culmen 42.

A second specimen, from the neighbourhood of Manado (Nat. Coll.) is darker on the under surface than the above, especially on the abdomen. Head black; the black moustachial and throat stripes broad and well-developed (C 10846).

Female. Much larger than the male.

Young. Head and neck white, narrowly streaked on the crown and more broadly on the neck with dark brown; all other upper parts dark brown with a purplish gloss as in the adult, the unexposed inner webs of the secondaries white; upper tail-coverts tipped with white, the basal part of the feathers varied with white and barred with brown; tail much as in the adult, crossed with three broad bars; under surface white, almost uniform on chin and throat, somewhat sparsely marked with drop — shaped spots of dark brown on the breast, a few broad but ill-defined markings of washy rufous on abdomen, indistinct bars of brownish rufous on the abdomen and under tail-coverts, and close bars of dark brown — narrower and less dark than in the adult — on the flanks and thighs; under wing-coverts white, spotted somewhat sparsely with dark brown; quills and tail below much as in the adult. (N. Celebes — Riedel in St. Petersburg Mus.)

Another specimen, still younger, much resembles the above, but has still more white about it; sides of wing more mottled with white; head and neck more narrowly streaked with brown; under surface white, marked with a few streaks of brown on the breast, thighs and flanks narrowly barred with rufous or brown, very indistinct on the inner side of the thighs; some brownish bars just discernible on

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[1]) A name given for *Spilornis rufipectus* also.

[2]) Prof. W. Blasius *(6)* has expressed the opinion that the black stripe down the middle of the throat mentioned by Bonaparte *(2)* does not really exist in this species. We find it to be always present in the adult and nearly adult, as shown by four before us, and Schlegel *(b II)* has described it in three in the Leyden Museum. It is, however, absent in the very differently plumaged young bird (see plate).

the under tail-coverts; under wing-coverts still more scantily spotted with brown than in the above. In almost every detail the description of the young *Pernis celebensis* would apply equally well to this bird (N. Celebes — Dresd. Mus.).

Immature. Intermediate between the young and adult: head whitish, broadly streaked with black, breast marked with guttate streaks of blackish brown; under parts mottled with pale brown and whitish, with feathers regularly barred with dark brown intermixed; flanks and thighs narrowly barrred as in the adult; upper parts dark brown, tail with five bands, the basal one indistinct (Banka Id., N. Celebes, 17. May 1893: Nat. Coll. — C 12235).

Two young specimens in the Leyden Museum have the head all white.

	Wing	Tail	Tarsus	Mid. toe without claw	Culmen from cere
a. (Nr. 6670) ♂ ad. S. Celebes (Platen) . . .	355	258	91	45	30
b. (C 12235) [♂] imm. Banka Id., N. Cel. 17. V. 93 (Nat. Coll.)	375	265	—	50	31
c. (Sarasin Coll.) ♂ vix ad. Lake Posso, 17.II. 95 (P. & F. S.)	358	265	91	—	29.5
d. (C 14246) [♂] juv. Lembeh Id. 28. II. 95 (Nat. Coll.)	355	260	—	—	31
e. (Mus. Petersb.) [♂] juv. N. Celebes (Riedel) .	370	270	91	49	31
f. (C 10846) [♀] ad. near Manado VIII—IX. 92 (Nat. Coll.)	410	290	97	53	35
g. (Sarasin Coll.) ♀ juv. Rurukan Forest, N. Cel. 2. VII. 94 (P. & F. S.)	395	276	—	—	34.5
h. Nr. 14077 [♀] juv. N. Celebes (Riedel) . . .	406	285	90	54	34

Distribution. Celebes and Sula. Gorontalo Distr. (Forsten *b 1, b 3*); Minahassa (Wallace *5*, v. Rosenberg *b 3*; etc.); Banka Island off the Minahassa (Nat. Coll. in Dresd. Mus.); Lembeh Island (Nat. Coll. ib.); Central Celebes — Lake Posso (P. & F. Sarasin *9*); South Celebes — Macassar (Wallace *5*), Tjamba Distr. (Platen in Dresd. Mus.), Maros (Weber *7*); Sula Islands — Sula Besi (Bernstein *b II, b 3*).

Aru, recorded as the land of origin of this species by von Pelzeln *(4)*, may be safely ascribed to erroneous labelling, as v. Pelzeln himself subsequently concluded (see: Salvadori *d 3*).

Nothing is known of the habits of this Hawk-eagle. The allied *S. limnaetus* of Java preys on rails, waterfowl, ducks, chickens, robbing also the nests of other birds (Schl. Astures, 7). Colonel Legge found the favourite food of *S. ceylonensis* (Gm.) to be a large lizard, *Calotes*. It also devours Squirrels and other small mammals (B. Ceylon, 59). The allied species, *S. cirrhatus* (Gm.) and *S. ceylonensis*, lay as a rule only one egg; *S. limnaetus* one or two eggs (Legge, l. c.; Oates, Hume's Nests and Eggs, 1890, III, 147, 149). Consequently, among the Hawk-eagles, there is no overcrowding; the birds are stationary, and a number of local races have been built up.

Touching the remarkable similarity of the plumage of this species to *Pernis celebensis*, see the descriptions of the latter and plates.

The form of *Spizaetus* most nearly allied to *S. lanceolatus* is perhaps *S. philippensis* Gurney. A figure of this species given by Walden (Tr. Z. S. 1875 IX, pl. XXIV) displays a bird very like the adult Celebesian Hawk-eagle,

but differing by having a crest, and the cross-bars on the under surface commencing first on the flanks, instead of extending on to the lower breast and abdomen. The *Spizaetus limnaetus* (or *caligatus* Raffl. as it is called by Gurney), ranging from India to Java, occurs, as Gurney remarks (Ibis 1877, 425), "under two very distinct phases of plumage, if, indeed both be really referable to one species" (see, also, Whitehead, Ibis 1889, 71), one black-brown all over, the other particoloured. *S. lanceolatus*, when adult, seems to be readily distinguishable by its barred legs from the latter.

GENUS LOPHOTRIORCHIS Sharpe.

A crested Hawk-eagle of medium size, differing from *Spizaetus* in having a much longer, more pointed wing, the secondaries falling short of the tip by one-third of the length of the wing (instead of one-sixth); the middle toe much longer, being three-fourths the length of the tarsus, instead of about one-half that length as in *Spizaetus*. Evidently a form of more sustained flying-powers. Preys on birds and small mammals. Probably not strictly stationary. One species ranging from the Himalayas to Celebes; a second in Columbia.

+ 13. LOPHOTRIORCHIS KIENERI (G. Sparre).

Rufous-bellied Hawk-eagle.

a. **Astur Kieneri** *(I)* G. S.[1]), Mag. Zool. 1835, pl. 35 (ad.).

b. **Spizaetus cristatellus** *(I)* Jard. & Selby, Ill. Orn. pl. 66.

c. **Spizaetus albogularis** Tickell apud Blyth, J. A. S. B. 1842, XI, 456.

d. **Limnaetus kieneri** Strickl., Ann. N. H. 1844, XIII, 33; *(1)* Jerd., B. of Ind. 1862, I, 74; Legge, Str. F. 1875, 198; *(2)* Gurney, Ibis 1877, 433; *(3)* Salvad., Orn. Pap. 1880, I, 5.

e. **Nisaetus kieneri** *(I)* Jerd., Ill. Ind. Orn. 1847, p. 5, pl. I.

f. **Spizaetus kieneri** Gray, Gen. B. 1845, I, 14; Bp. Consp. 1850, I, 29; Blyth, J. A. S. B. 1850, 335; Horsf. & Moore, Cat. B. Mus. E. Ind. Co. 1854, I, 34; Strickl., Orn. Syn. 1855, I, 71, *(1)* Schl., Mus. P.-B. Astures, 1862, 11; *(2)* Gurney, Gld. B. of Asia 1863, pt. XV; *(3)* Wall., Ibis 1868, 14; Gray, HL. I, 13; *(4)* Hume, Rough Notes 1869, 201, 216; *(5)* Schl., Rev. Acc. 1873, 58; *(6)* Hume, S. F. 1873, I, 310; *(7)* Salvad., Ucc. Borneo, 1874, 16; *(8)* Reichnw., J. f. O. 1877, 218; *(9)* W. Blas, ib. 1883, 121, 122; *(10)* Hartert, ib. 1889, 374.

g. **Spizaetus kieneri** Blyth, Cat. B. Mus. As. S. B. 1849, 26.

Lophotriorchis kieneri *(1)* Sharpe, Cat. B. 1874, I, 255, 458; *(2)* Legge, B. Ceylon, 1880, 43—46; *(3)* Hume, Str. F. 1880, IX, 273, 274, 277; *(4)* Gurney, Diurn. B. of Prey 1884, 50; *(5)* Sharpe, Ibis 1889, 71; id., ib. 1890, 274; *(6)* Everett, J. Str. Br. R. A. S. 1889, 182; *(7)* Steere, List B. Philip. Is. 1890, 7; *(8)* Salvad., Ann. Mus. Civ. Gen. 1891, XII, 41; *(9)* Hose, Ibis 1893, 419; *(10)* Blanf., Faun. Br.

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[1]) Dr. R. B. Sharpe and others ascribe these initials to Geoffroy St. Hilaire; Count Salvadori and Schlegel to Gervais; Colonel Legge shows good reason for believing them to belong to G. Sparre.

Ind. B. III 1895, 345; *(11)* Grant, Ibis 1895, 438; *(12)* Hartert, Nov. Zool. 1896, 575.

Figures and descriptions. G. S. *a I*; Jardine & Selby *b I*; Jerdon *d 1*; Schlegel *f 1*; Gurney *f 2*; Sharpe *1*; Hume *f 6*, *3*; Legge *2*, Blanford *10*.

Adult. Above blackish brown, 6 or 7 narrow indistinct bars on tail; occipital crest about 60 mm long; chin, throat and breast white, passing into ferruginous on the remaining under parts, which, together with the sides of the breast, are marked with dark shaft-streaks; tail below greyish; quills below white, greyer towards tip; under wing-coverts with the greater series tipped with white and edged with fulvous.

Measurements.

	Wing	Tail	Tarsus	Culmen from cere
♂	360—394	208—228	68.5—76	25.5—28
♀	432—444	254—317	76	30.5 (from Legge *2*).

Immature. Crown and sides of head and neck tawny-brown, becoming more fulvous on neck; the bases of the feathers white (producing a mottled appearance on the crown in which the tawny-brown feathers of a more advanced stage of dress are sprouting); short occipital crest (1.6 in.) brown as head; upper parts Prout's Brown, becoming drab-colour mixed with whitish on the greater wing- and upper tail-coverts; secondaries and the three inmost primaries tipped with whitish; tail brown as back, crossed with five narrow equidistant bars of black of fairly equal width and separated by spaces of about 25 mm; all under parts, including legs, pure white; the flanks and outer side of the thighs with some feathers of brownish intermixed. Wing 362 mm; tail 230 mm; tarsus 71 mm; middle toe 53 mm. Celebes: v. Muschenbr. Nr. 6671).

Distribution. Himalayas (Sparre *a I*; Inglis *2*, etc.); India (Jerdon *d 1*, Tickell *2*); Ceylon (Bligh, Legge *2*); Malacca and Singapore (Hume *3*); Sumatra (Hartert *f 10*, Modigliani *8*); Java (Gurney *f 2*); Borneo (Wallace *f 3*; Whitehead, Fischer, *5*, *6*); Philippines, Luzon (Gevers *f 1*, *f 5*, Whitehead 11); Mindanao, Panay, Marinduque (Steere *7*); Celebes (Faber *f 8*, *f 9*, van Musschenbroek in Mus. Dresd.); ? Batchian (Norwich Mus. *d 2*, *d 3*); Satonda, Lesser Sunda Is. (Doherty *12*).

The first mention of the occurrence of this species in Celebes was made by Prof. Reichenow in reference to a specimen brought from that island by v. Faber, and later, in answer to a communication from Prof. W. Blasius, Dr. Reichenow confirmed his first note *(f 9)*. A second specimen in the Dresden Museum, labelled Manado by van Musschenbroek, is in immature plumage, and corresponds fairly well with one described by Hume, Str. F. IX, 274. We have described it above.

Probably because the immature plumage of this species remained for a long time unknown, there has been much misconception touching the specimen in the Leyden Museum from Luzon referred by Schlegel to this species. Gurney *(f 2)* included this specimen under his *Spizaetus philippinensis*, overlooking the much longer tarsi and tail of that species; and other authorities have followed him. Consequently the Philippine Islands have been generally struck out of the range of this species. There is no reason to doubt the correctness of Schlegel's identification of the specimen from the Philippines, and in the

Leyden Museum we have seen just such another immature bird from the Philippines as that described above from Celebes.

The specimen in the Norwich Museum stated to have come from Batchian bears no collector's name on the label. It was purchased of Bouvier of Paris, and most probably the locality indicated is quite correct, but, until more evidence is forthcoming, it must be looked upon as of uncertain origin (see Salvadori *d 3*).

The genus *Lophotriorchis*, founded by Dr. Sharpe for this species and *Sp. isidori* of South America and to which *L. lucani* Sharpe & Bouvier of S. W. Africa has since been added[1]), occupies a position about midway between *Nisaetus* and *Spizaetus*, resembling the former by its long wings, feet and tarsi, and the latter by its bill and immature plumage. The specimen in the Dresden Museum agrees in many respects of coloration with *Spizaetus alboniger* Blyth, juv., from Malacca and Borneo, but the following scheme shows how widely they differ structurally:

L. kieneri juv.	wing	14.25	mid. toe	2.10
	tarsus	2.80	tarsus	2.80
S. alboniger juv.	wing	11.00	mid. toe	1.375
	tarsus	2.625	tarsus	2.625

It will be found that, in proportion to the tarsus, the wing of *Lophotriorchis kieneri* is 2½ inches longer than that of *Spizaetus alboniger*, and the middle toe 0.64 inches longer.

L. kieneri is a rare species, and little is known of its habits. Colonel Legge points out that it is a hill-haunting bird. Its food consists of birds and small mammals; Mr. Wallace's Sarawak example was killed while devouring a pigeon — a fact which points to its fine flying powers, which have been remarked upon by Legge and others.

From its rarity Mr. Whitehead *(5)* believes this to be a migratory species in Borneo, visiting the country during the N. E. monsoon, towards the end of which (March 20th, 1887) his specimen from Kini Balu was obtained. Mr. Hume's example from Singapore and Count Salvadori's from Sumatra were likewise shot during the N. E. monsoon, viz: Jan. 19th 1880, and Feb. 3rd 1891, respectively. Dr. Steere found it in Mindanao, Panay and Marinduque in Oct.—Dec., January and May, the last being a very late date for a migratory species; but until more evidence is forthcoming of course no conclusion as to migration can be drawn.

GENUS ICTINAETUS Jerd.

This Eagle is well characterized by its foot: the inner toe, including the claw, is much longer than the middle one; the claws very little curved, that of the hallux and of the inner toe very long, exceeding the length of the

[1]) Gurney considered this species to be *Nisaetus spilogaster* juv. (Diurn. B. Prey, 52, note).

toes; tarsi completely feathered; wings very long; edge of upper mandible without any tooth or festoon. A single species, ranging from the Himalayas to the Moluccas; possibly migratory. It carries off birds' nests, for which purpose its foot is adapted, and devours the eggs or young; feeds also on reptiles, mammals.

+ 14. ICTINAETUS MALAYENSIS (Reinw.).

Black Eagle.

a. **Falco malayensis** *(I)* Reinw. in Temm., Pl. Col. Nr. 117 (1824).

b. **Aquila malayensis** Vig., Zool. Jrn. 1824, I, 337; *(1)* Schl., Mus. P.-B. Aquilae 1862, 11; *(II)* id. Valkv. 1866, 8, 49, pl. 3, f. 1, 2; *(3)* id., Rev. Acc. 1873, 116; *(4)* Rosenb., Malay. Arch. 1878, 271.

c. **Aquila (Heteropus) pernigra** Hodgs., J. A. S. B. 1836, V, 227.

d. **Nisaetus ovivorus** Jerd., Madr. Journ. 1844, XIII, 158.

e. **Neopus perniger** Hodgs. in Gray's Zool. Misc. 1844, 81.

f. **Ictinaetus perniger** Blyth, Ann. N. H. 1844, XIII, 114.

g. **Onychaetus malayana** Kaup, Classif. Säug. u. Vög. 1844, 120.

h. **Neopus malayensis** Gray, Cat. Hodgs. Coll. B. 1846, 42; *(1)* Beavan, P. S. Z. 1868, 396, pl. XXXIV; *(2)* Sharpe, Cat. B. 1874, I, 257; *(3)* Brüggem., Abh. Ver. Bremen 1876, V, 45; *(4)* Gurney, Ibis 1877, 423; *(5)* Legge, B. Ceylon 1880, 47; *(6)* Salvad., Orn. Pap. 1880, I, 6; *(7)* Oates, B. Brit. Burmah 1883, II, 190; *(8)* Davison, Str. F. 1883, X, 335; *(9)* Sharpe, P. Z. S. 1888, 268; *(10)* id., Ibis 1889, 71; id., ib. 1890, 274; Everett, J. Str. Br. R. A. S. 1889, 181; *(11)* Oates, Hume's Nests and Eggs 1890, III, 145; *(12)* Salvad., Orn. Pap. Agg. 1889, 11; *(13)* Hartert, J. f. O. 1889, 376; *(14)* Sharpe, Ibis 1893, 563; *(15)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 1, p. 4; *(16)* Büttik., Notes Leyden Mus. 1896, XVIII, 195.

Ictinaetus malayensis *(1)* Blanf., Faun. Brit. India B. III, 1895, 347.

"Oopo", Celebes (v. Rosenb. *b 4*).

For full synonymy and references see Salvadori *6*.

Figures and descriptions. Temminck *a I*; Schlegel *b II*; Beavan *h I*; Sharpe *h 2*; Gurney *h 4*; Legge *h 5*; Salvadori *h 6*; Oates *h 7*, *h 10* (egg); Blanford *1*.

Adult. Entire plumage brownish black; tail marked on the upper surface with about 7 indistinct and broken bars of brownish grey, which are whitish and distinct on the under surface (Halmahera Nr. 2945). Iris brown; bill, gape and feet yellow; tip of bill black.

Young. Above brownish black; greater wing-coverts and secondaries tipped, the tail-coverts barred, with white; the feathers of the back, lesser, and middle wing-coverts with a small whitish spot at the tip of each; tail black, indistinctly crossed with numerous bars of grey-brown; feathers of head and neck broadly margined and tipped with whitish; face, throat and under surface pale tawny, with broad sooty brown margins to the feathers of the breast and sides; wings and tail below marbled with broken bars of whitish (♂ juv. Loka, S. Celebes, 6. X. 95: P. & F. Sarasin).

Measurements.	Wing	Tail	Tarsus	Bill from cere
a. (Sarasin Coll.) ♂ juv. Loka, S. Cel. 6. X. 95 . . .	530	294	73	26
b. (Sarasin Coll.) ♀ [?] juv. Rurukan, N. Cel. 20. XI. 94	538	285	71	30
Small ♂ adult (from Legge *h 5*)	520	305	81	34
Large ♀ adult (from Legge *h 5*)	635	375	97	35

Distribution. India, Ceylon, Burmah, Tenasserim, Malacca, Sumatra, Java, Borneo, Celebes, Ternate, Halmahera (fide Legge *h 5*, Salvadori *h 6*), Nias (Nieuwenhuisen & v. Rosenberg *h 16*. In Celebes: — Minahassa (v. Duivenbode *b 3*, Fischer *h 3*, P. & F. Sarasin *h 15*); S. Peninsula, Loka (P. & F. Sarasin); (?) Sula (apud G. R. Gray, HL. 1869, I, 11).

Though the locality Sula may very probably be correct, G. R. Gray, as Salvadori has remarked, has never shown his grounds for this indication.

The remarkable shape of the foot of this Aquiline species is connected with something very unusual in its habits. "It subsists", writes Colonel Legge, "as far as can be observed, entirely by bird-nesting, and is not content with the eggs and young birds which its keen sight espies among the branches of the forest trees, but seizes the nest in its talons, and decamps with it, and often examines the contents as it sails lazily along. Furthermore, Mr. Bligh informs me that he once found the best part of a bird's nest in the stomach of one of these Eagles which he shot in the Central Province! . . . . . The long inner claws of this bird seem especially adapted for the work of carrying off loose and fragile masses such as the nests of birds". Their length and straightness also, it may be added, would enable the bird to let fall a nest, when it has done with it, without difficulty and risk of entanglement, — no small consideration, when it is remembered into what a panic of alarm and rage a wild animal is thrown at finding itself clung to by an object from which it tries in vain to free itself. It also occasionally carries off large birds, but this may be of rare occurrence; a rat in the stomach is noted by Beavan *(h 1)*; a rat, a bird's egg and a snake's egg by Mr. Wray *(h 9)*; a snake by Davison *(h 8)*. Temminck states probably from information of Reinwardt that it eats insects, as well as birds and reptiles. In India Jerdon remarks that "doves, and perhaps some other birds breed at all times in the year; and it may, perhaps, obtain eggs or nestlings at all seasons, by shifting its quarters and varying the elevations, if not, it probably may eat reptiles; but of this I cannot speak from observation".

This Eagle is rare in Celebes and in the other parts of the Malay Archipelago where it has been found, and we suspect, it occurs only in migration, or as a somewhat frequent straggler. It was never met with by Mr. Wallace in any island; Meyer never saw it in Celebes, and the only examples recorded from there prior to 1894 were two, both immature — one in the Leyden *(b 3)* and the other in the Darmstadt Museum.

In November 1894, a third example, also young, was obtained by the

cousins Sarasin in the same province as the previous specimens, the Minahassa, and in October, 1895, a young example from the extreme south of the island was added to their collection.

When von Rosenberg in his "Malayischen Archipel", p. 271, speaks of it as being "nicht sehr häufig", there we do not doubt that he must have mistaken some other large bird of prey for it; especially as there is no specimen obtained by him in the Leyden Museum. No doubt the movements of this bird will be found to depend mainly upon the time of production of its favourite diet, the eggs and young of other birds; and this varies in different localities. Mr. Whitehead has obtained it in Borneo in June. Other notices are: N. Celebes, November; S. Celebes, October; Ternate, March (Bernstein *b 3*) and December (Bruijn *h 6*); Halmahera, December (Bruijn *h 6*); Borneo, October and February (Doria and Beccari, Salvad. Ucc. Borneo 1874, 5, Whitehead *h 10*); Malay Peninsula, Sept.—Oct. (Wray *h 9*). In the winter months also it has been noticed to be more plentiful in the Himalayas at an elevation of seven or eight thousand feet than it is during the hot season (Legge *h 5*), a curious reversion of the usual rule of migration, namely, that of going to a warmer climate during the cold season, and showing that food is of greater consequence to birds than is the weather.

GENUS HALIAETUS Sav.

The Sea-eagles are of large size; wing very long, tail rounded, "scarcely exceeding the closed wings" (Legge); tarsus stout, the upper third feathered in front, the lower two-thirds covered in front with transverse shields; toes moderate; claws semicircularly hooked, grooved below, soles very rugose, furnished with sharp horny points (adapted for holding slippery booty like fish); bill large, basally — where covered by the cere — straight, tomia with a slight festoon. Feeds on mammals, reptiles, fish, carrion. Lays two eggs. Six species, migratory and stationary, distributed over most of the tropical and temperate sea-coasts of the world, except those of South America.

15. HALIAETUS LEUCOGASTER (Gm.).

White-bellied Sea-eagle.

a. **Falco leucogaster** Gm., S. N. 1788, I, 257 (ex Latham).
b. **? Falco blagrus** Daud., Tr. d'Orn. 1800, II, 70 (ex Levaill.).
c. **Falco oceanica** *(I)* Temm., Pl. Col. 1823, Nr. 49.
Haliaetus leucogaster Vig., Zool. Journ. 1824, I, 336; *(I)* Gld., Syn. B. Austr. 1838, pl. 37, f. 1; *(2)* Schl., Mus. P.-B. Aquilae 1862, 14; *(III)* id., Valkvogels 1866, 9, 50, pl. 4, f. 1, 2; *(4)* Finsch & Hartl., Orn. Centralpol. 1867, 1; *(5)* Schl., Rev. Accip. 1873, 117; *(6)* Sharpe, Cat. B. 1874, I, 307; *(7)* Legge, B. Ceylon 1880, 68; *(8)* Vidal, Str. F. 1880, 32; *(9)* Gurney, Ibis 1882, 235; *(10)* Oates, B. Brit. Burmah 1883, II, 199; *(11)* Gurney, Diurn. B. of Prey 1884, 59; *(12)* Vorderman, N. Tijd. Ned. Ind. XLII, 3 (sep. copy); *(12bis)* Guillem., P. Z. S. 1885, 545; *(13)*

Styan, Ibis 1888, 232; *(14)* Sharpe, Ibis 1888, 195; *(15)* id., ib. 1889, 73; 1890 274; *(16)* Hartert, J. f. O. 1889, 376; *(17)* Everett, J. Str. Br. R. A. S. 1889, 183; *(18)* North, Nests and Eggs B. Austr. 1889, 7, pl. I, f. 2 (egg); *(19)* Steere, List B. Philip. 1890; 7; *(20)* Oates, ed. Hume's Nests and Eggs Ind. B. 1890, III, 161; *(21)* Hose, Ibis 1893, 419; *(22)* Büttik., Zool. Ergebn. Weber's Reise in Ost-Ind. 1893, III, 272, 286, 290; *(23)* Studer, Reis. Gazelle 1889, III, 198; *(24)* Hagen, Td. Ned. Aard. Genoots. 1890 *(2)* VII, 130; *(24bis)* Hickson, Nat. in N. Celebes 1889, 35; *(25)* Bourns & Worces., B. Menage Exped. 1894, 33; *(26)* Vorderm., N. T. Ned. Ind. 1895, 318; *(27)* Blanf., Faun. Br. Ind. B. III 1895, 318; *(28)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8 p. 4; *(29)* iid., ib. 1896, Nr. 2, p. 7.

d. **Haliaetus sphenurus** *(I)* Gld., Syn. B. Austr. 1838, pl. 37, f. 2.

e. **Ichthyaetus leucogaster** *(I)* Gld., B. Austr. 1848, I, pl. 3; *(II)* Diggles, Orn. Austr. 1866, pt. 5.

f. **Cuncuma leucogaster** Gray, Cat. Acc. Br. Mus. 1848, 24; *(1)* Hume, Str. F. 1876, IV, 422, 461, 462; *(1a)* Meyer, Ibis 1879, 56; *(2)* Salvad., Orn. Pap. 1880, I, 7—11, 548, et Agg. 1889, 11; *(3)* W. Blas., P. Z. S. 1882, 698; *(4)* id., Ornis 1888, 304; *(5)* Salvad., Orn. Pap. Agg. 1889, 11; *(6)* Hartert, Nov. Zool. 1895, 476; *(7)* Salvad., Ann. Mus. Civ. Gen. 1896, XXXVI, 58.

"Kadjawali", Main, Minahassa, Nat. Coll.
"Koheba laut", Lembeh Id., iid.
"Bunia", Tonkean, E. Celebes, iid.
"Kuwajang", Banggai Id., iid.

For further synonymy and references see Salvadori *f 2, f 5.*

Figures and descriptions. Temminck *c I*; Gould, *I, d I, e I*; Schlegel III; Diggles *e II*; North *18* (egg); Finsch & Hartlaub *4*; Schlegel *5*; Sharpe *6*; Hume *f 1*; Salvadori *f 2*; Legge *7*; W. Blasius *f 3*; Vorderman *12*; Blanford *27*; *etc.*

Adult. Head, neck and all the under parts white; upper surface of body ashy grey; primaries and base of tail slaty-blackish; end of tail white for the terminal 90 mm (ca.), (E. Celebes, Nat. Coll. — C 14355). "Bill black, base and cere lead colour; feet very pale yellow (dirty white — Whitehead *15*); iris olive brown" (Wallace).

Young. Above brown, more whitish tawny on the region of the head and neck, darker on the back, all the feathers edged with paler brown, fulvous or whitish; below rufous brown and tawny, varied with whitish; tail whitish, terminal third blackish brown (juv. Minahassa, 9. II. 94, Nat. Coll. — C. 13236).

The following are taken from extreme measurements made by Legge, Sharpe and W. Blasius *(6, 7, f 3)* and three adults from Celebes in the Dresden and Sarasin Collections.

Measurements.	Wing	Tail	Tarsus	Culmen with cere
Small ♂	535	240	87	50
Large ♀	610	315	107	55

Eggs. Generally 2, white; seen against the light blackish green; often smeared with brown or yellowish — probably from the fæces of the parent bird. Average measurements: 71.4 × 52.6 mm (Oates *20*, North *18*).

Breeding season. West coast of India and Ceylon, October—December *(8, f 1, 7)*; mouth of the Hoogly and Nicobar Islands, end of January *(20)*; North Borneo, a nest with

nearly fledged young ones on April 12th — hence the eggs were laid at the end of February or early in March *(15)*; New South Wales, first eggs laid in July *(18)*.

Nest. A large mass of sticks, lined with finer ones, situated in a great tree or — where this is wanting — on a rock *(18, 20)*.

Distribution. India and South China to Ceylon, Laccadive, Andaman and Nicobar Islands; Siam, Cochin China, Philippines; throughout the East Indian Archipelago to New Guinea, the Admiralty and Solomon Islands; Australia; Tasmania; ?Tonga Islands. [For exact localities and authorities, cf. Salvadori, *f 2*; and add Cochin China (Moreau *9*), Palawan (Platen *f 4*, Whitehead *14*), Natuna Is. (Hose *f 6*), Noordwachter Id. (Vorderman *26*), Dana Id. (Studer *23*)].

In the Celebesian area: — (Forsten *2*, Wallace), Minahassa (v. Duivenbode *5*, Meyer *f 1a*, etc.), Lembeh Id. (Guillemard *12bis*, Hickson *24bis*, Nat. Coll.), E. peninsula (Nat. Coll. *29*), S. peninsula (Weber *22*); Saleyer Id. (Weber *20*); Banggai Id. (Nat. Coll. *29*).

The original authority for the Tonga Islands appears to be Lesson (Man. d'Orn, 1828, I, 85). No reliable confirmation of the species having occurred there has been produced since this date.

Until more evidence is forthcoming it is advisable to exclude the Cape of Good Hope from the range of this species. "Le Blagre" of Levaillant, commonly identified with it, was indicated as an African species, and there is a specimen in the British Museum from the late Jules Verreaux with the locality Cape of Good Hope indicated; but, since the country has become better known, no confirmation of these statements has come to hand. (See Sharpe *6*, Salvad. *f 2*, Legge *7*).

Schlegel *(5)* points out that this Sea-eagle, like *Haliastur indus*, often has black shaft-streaks in the white adult plumage, and also points out that in their first plumage the two species are similar. It is not the case, however, that specimens with dark shaft-streaks are peculiar to any special part of the range of the species.

The White-bellied Sea-eagle is a bird of the sea-coast, though sometimes found to a distance of 60 miles or so up the mouths of the larger rivers of Burmah (Oates), and Colonel Legge notes the fact of its breeding at some of the large inland lakes of Ceylon. Its food consists chiefly of sea-snakes, fish, cuttle-fish and other marine animals. In Java Mr. de Bocarmé *(2)* remarks that it preys on dead carcases thrown up on the strand at the mouths of rivers; and at Pigeon Island off the W. coast of India Hume shot one while bearing in its claws the stomach and liver of a Goat, and found the remains of a sheep's head, amongst the bones of sea snakes, etc., beneath the nest of another; but it does not appear to attack mammals when alive, though it has been known to carry off wounded birds.

The normal number of eggs is two. The time of laying varies much, even in districts not far from one another, as is pointed out above.

H. leucogaster has no very close allies. It is easily distinguishable from other birds of prey in Celebes by its large size, and the adult by its striking coloration.

GENUS POLIOAETUS Kaup.

In structure this form is very like *Haliaetus*, though smaller, but it may be distinguished by its claws, which are rounded below, and by its shorter, more rounded wings, which when closed fall considerably short of the tip of the tail (Legge), and in which the 4th and 5th quills, instead of the 3rd, are the longest; the tibial plumes are short, not overreaching the upper third of the tarsus. There are two species, inhabiting the Indian Region from the Himalayas to Celebes; they prey chiefly upon fresh-water fish, and lay 3 eggs.

16. POLIOAETUS HUMILIS (Müll. Schl.).

Lesser Fishing-eagle.

Of this species there are two pronounced races, which are said to blend in Cachar.

+ 1. The typical Polioaetus humilis (Müll. Schl.)

a. **Falco humilis** *(1)* M. et S., Verh. Nat. Gesch. Natuurk. Comm., Aves, 1839—44, 47, pl. 6.
b. **Ichthyaetus nanus** Blyth, J. A. S. B. 1842, XI, 202; 1843, XII, 304 (Singapore).
c. **Pandion humilis** Kaup, Classif. Säug. u. Vög. 1844, 122; *(1)* Schl., Valkvogels 1866, 13, 53, pl. 5 f. 3.
d. **Polioaetus humilis** Kaup, Contr. Orn. 1850, 73; *(1)* Wall., Ibis 1868, 14; *(2)* Sharpe, Cat. B. 1874, I, 454; *(3)* Salvad., Ucc. Borneo 1874, 6; *(4)* Gurney, Ibis 1878, 455—458; *(5)* Hume, Str. F. 1880, IX, 244; *(6)* Oates, B. Brit. Burmah 1883, II, 223; *(7)* W. Blas., Ztschr. ges. Orn. 1885, 222; *(8)* Everett, J. Str. Br. R. A. S. 1889, 183; *(9)* Hartert, Nov. Zool. 1895, 476.
e. **Haliaetus humilis** Schl., Mus. P.-B. Aquilae, 1862, 18.
f. **Pontoaetus humilis** *(1)* Blyth, Ibis 1863, 22.
g. **Polioaetus humilis subsp.** Gurney, Diurn. B. of Prey 1884, 60.
h. **Polioaetus plumbeus humilis** *(1)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 2, p. 7.

"Kuajan pupusi", Peling Id., Nat. Coll.

For further references see Sharpe *d 2*, Salvadori *d 3*, Oates *d 6*.

Figures and descriptions. Müller & Schlegel *a I*; Schlegel *c I*; Sharpe *d 2*; Gurney *d 4*; Hume *d 5*; Oates *d 6*; W. Blasius *d 7*.

Diagnosis. Size smaller; bill much smaller; foot and tarsus markedly slenderer, though not shorter (Hume *d 5*); the dark band across the end of the tail a little more distinct (Gurney *d 4*).

Adult. Abdomen, thighs and under tail-coverts white; all other parts ashy brown, more chocolate colour on the back and wings; throat and cheeks slightly streaked with whitish; terminal fourth of tail indistinct dark brown, tip whitish (ad. Peling Id., V—VIII, 95: Nat. Coll., C 14497). "Bill and cere dusky lead-colour; feet pale bluish white; iris light yellow" (Wallace *d 1*).

Young male. Above brown, the feathers margined with fulvous brown; on lower back and rump varied with white; tail-feathers brown, white at the base and on the inner web, and indistinctly barred with blackish brown; forehead, sides of head, hind

neck and entire under surface white, the feathers margined on the first-named parts, on the breast and greater under wing-coverts with very pale ashy brown (from Sharpe).

Measurements.	Wing	Tail	Tarsus	Exposed Culmen
♂ juv. (Sharpe *d 2*)	350	193	72	
♀ ad. (W. Blas. *d 7*)	415	223	74	40
(C 14497) ad. Peling Id.	415	215	76	40

Distribution. Cachar, India (Inglis *d 5*); Assam (Brit. Mus. *d 2*); Burmah (Hume *d 6*); Malay Peninsula (Blyth *f 1*); Singapore (Strickl. *d 3*); Bunguran (Hose *d 9*); Borneo (Doria & Beccari, Everett, Platen *d 8*); South Celebes — Macassar (Wallace *d 2*); Tjamba (Platen *d 7*); Peling Island (Nat. Coll.).

2. Polioaetus humilis major n. subsp.[1])

Diagnosis. Size larger (wing, generally, 430—460 mm, but sometimes 483 mm — Blanford), bill much larger, foot and tarsus stouter (Hume).

Distribution. "The sub-Himalayan ranges and submontane tracts (occasionally in the cold season straying some distance into the plains) from the borders of Afghanistan to Suddya in Assam" (Hume, Str. F. 1877 V, 130).

3. Polioaetus humilis — major.

Diagnosis. Intermediate.

Distribution. The birds of Cachar are said to be intermediate between the typical *P. humilis* and *P. humilis major*. (Blanford, Faun. Br. Ind., B. III 1895, 372.)

This species, like the allied *P. ichthyaetus* Horsf., probably lives almost entirely upon fish, caught chiefly in inland waters. In N. E. Cachar Mr. Inglis noticed that it was more often to be found in the neighbourhood of rivers than jheels. In the Malay Archipelago it appears to have been very seldom met with. Only two specimens, as Prof. W. Blasius points out, had hitherto been recorded from Celebes, both of them from the Macassar Peninsula, but another has now been obtained in Peling Island by the native hunters working for the Dresden Museum. One specimen from Borneo in the Norwich Museum was mentioned by Gurney, Ibis 1878, 458, and not more than three others from there, we believe, were known to Mr. Everett at the time of compiling his List (1889). In Java it does not yet appear to have been noticed.

The large race of the Himalayas is stated to build a great nest in trees, the same pair returning yearly and adding to the structure. The usual number of eggs is three (Oates, Hume's Nests and Eggs, III, 169).

The allied *P. ichthyaetus* (Horsf.) is, as Gurney points out, a larger bird, having, when adult, the tail white[2]).

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[1]) This form has often been called *P. plumbeus* Hodgs., which is a nomen nudum, and of uncertain application.

[2]) **Polioaetus ichthyaetus** (Horsf.).

In giving the distribution of this species Cat. B. I, 453, Dr. Sharpe notes Celebes among other localities,

GENUS BUTASTUR Hdgs.

The Buzzard-eagles are of small-medium size (about as big as a Crow); wing long, primaries overreaching the secondaries by about one-third of the wing-length; tail moderate, slightly rounded; tarsus naked (except for the upper fourth in front), covered with polygonal scales, the largest in front; toes rather short; cere large, occupying two-fifths of the exposed culmen, bill not powerful for a bird of prey. Preys on reptiles, amphibians, insects. Four species, among them migratory and probably stationary forms, found from India and S. E. Siberia to New Guinea; also N. E. Africa.

+ 17. BUTASTUR INDICUS (Gm.).

Grey-faced Buzzard-eagle.

a. **Javan Hawk** Lath., Gen. Syn. Suppl. 1787, 32.
b. **Falco indicus** Gm., S. N. 1788, I, 264.
c. **Falco poliogenys** *(I)* Temm., Pl. Col. 1825, Nr. 325.
d. **Buteo poliogenys** Less., Man. d'Orn. 1828, I, 103; *(I)* Temm. & Schl., Faun. Jap. Aves 1845, 21, pl. VII B (juv.); *(2)* Schl., Mus. P.-B. Buteones, 1862, 22; *(III)* id., Valkvogels, 1866, 33, 70, pl. 21, f. 2, 3; *(4)* id., Rev. Acc. 1873, 111.
e. **Poliornis poliogenys** Kaup, Classif. Säug. u. Vög. 1844, 122.
f. **Poliornis barbatus** (Eyton).
Butastur indicus *(1)* Sharpe, Cat. B. I, 1874, 297; *(2)* Walden, Tr. Z. S. 1875, IX, 143; *(3)* id., P. Z. S. 1877, 689, 757; *(4)* id., ib. 1878, 612; *(5)* David & Oust., Ois. Chine, 18; *(6)* Hume & Davison, Str. F. 1878, VI, 19—21, 497; *(7)* Salvad., Orn. Pap. 1880, I, 14, et Agg. 1889, 12; *(8)* Kelham, Ibis 1881, 365; *(9)* Gurney, ib. 1882, 235; *(10)* Kutter, J. f. O. 1883, 295; *(11)* Oates, B. Brit. Burmah 1883, II, 197; *(11bis)* Gurney, Diurn. B. of Prey 1884, 73; *(12)* Pleske, Bull. Ac. Petersb. 1884, XII, 111; *(13)* Guillem., P. Z. S. 1885, 253, 545; *(14)* W. Blas., Ornis 1888, 541; *(15)* Sharpe, Ibis 1888, 195; *(16)* W. Blas., Ornis 1888, 304; *(17)* Sharpe, Ibis 1889, 72; 1890, 274; *(18)* Everett, J. Straits Br. R. A. S. 1889, 183; *(18bis)* Salvad., Orn. Pap. Agg. 1889, 12; *(19)* Tristr., Cat. Coll. B. 1889, 63; *(20)* Whitehead, Ibis 1899, 42; *(21)* Steere, Coll. B. Philip. Is. 1890, 7, 5; Seebohm, B. Japan 1890, 196; *(22)* Styan, Ibis 1891, 488; *(23)* Seebohm, Ibis 1893, 52; *(24)* Hose, t. c. 418; *(25)* Tacz., Faun. Orn. Sib. Orient. I, 1891, 69; *(26)* Stejn., P. U. S. Nat. Mus. 1893, 624; *(27)* Grant, Ibis 1894, 503; *(28)* Bourns & Worces., B. Menage Exped. 1894, 33; *(29)* Everett, Ibis 1895, 32; *(30)* Grant, t. c. 438; *(31)* Blanf., Faun. Br. Ind. B. III, 1895, 365; *(32)* M. & Wg., Abh. Mus. Dresden 1895 Nr. 8, p. 4; *(33)* iid., ib. Nr. 9, p. 1; *(34)* iid., ib. 1896 Nr. 1, p. 4; *(XXXV)* Meyer, Abb. v. Vogelskeletten 1897, Taf. CCXI.

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but we do not know upon what grounds this statement was made. As this learned ornithologist omits Celebes from the range of *P. ichthyaetus* in his tables showing the distribution of Bornean birds in The Ibis 1890, 274, we conclude that he has since found reason to believe himself to have been in error, especially as no such bird has been recorded from Celebes of late years. When Hume (Str. F. V, 129), Legge (B. Ceylon, 74), Oates (B. Br. Burmah, II, 222), and Blanford (Faun. Br. Ind. B. III 1895, 370) also make mention of Celebes as the most eastern bounds of its distribution, it would appear that their statements are founded upon that of Dr. Sharpe.

"Sikep sedang", Minahassa, Nat. Coll.
"Dandape", Great Sangi, iid.
"Tagi", Talaut Islands, iid.

For synonymy and further references see Salvadori *7*, *18bis*.

Figures and descriptions. Temminck *c I*; Temm. & Schl. *d I*; Schlegel *d III*, *d 2*; Sharpe *1*; Hume & Davison *6*; Salvadori *7*; Oates *11*; Taczanowski *25*; Blanford *31*; Meyer *XXXV*, etc.

Adult. Above dark grey-brown, shafts blackish, bases of the feathers drab; head above and nape blacker, with rufous edges; wing-coverts hazel-brown, a few whitish terminal spots thereon; secondaries grey-brown, tips whitish, primaries and primary coverts blacker, the unexposed parts rufous-hazel, crossed with narrow partially obliterated bars; upper tail-coverts broadly tipped and barred with white; tail crossed with about four blackish bands, tip whitish; cheeks and ear-coverts drab, with black shaft-lines, submalar stripe and one down the middle of the throat blackish; chin and throat laterally white; under parts white, crossed with brace-shaped bars of rufous-brown, chest nearly uniform rufous-brown; under tail-coverts buff-white; under wing-coverts buff-white, with sparing hastate spots of rufous; wing-below, where it rests upon the body, white, the bars nearly obliterated, distal ends of remiges blackish (♂ ad. Tomohon, N. Celebes, 9. IX. 94: P. & F. Sarasin.

"Iris golden yellow; bill chrome-yellow at base, rest black; cere chrome; legs dull chrome-yellow; claws black" (Everett *13*).

Female. Similar to the male, but larger.

Young. Differs from the adult in having the under parts white, streaked with rufous-brown (not barred); the dark stripe down the middle of the throat much reduced or absent; cheeks and ear-coverts blackish brown (not drab); head above white, saturated with rufous on occiput and nape, and streaked with blackish brown; feathers of the upper parts with pale terminal edges, white on some of the wing-coverts (♂ juv. Rurukan, N. Cel., 22. XI. 94: P. & F. Sarasin).

"Iris dark yellow; bill black, cere yellow; legs and feet yellow" (P. & F. S.).

Measurements (extremes from small male to large female). Wing 306—345 mm; tail 190—213; tarsus 58—62.

Eggs. Not positively known.

Distribution. Japan, Ussuriland *(25)*, China, Formosa, Cochin China, Tenasserim, Malacca, the Philippines, including Palawan *(4, 15, 16)*, Balabac *(29)* and Sooloo *(13)*, Borneo, Labuan, Java, Celebes — Northern Peninsula (Rosenberg, Duivenbode, Riedel *d 4*, Guillemard *13*, etc.), Siao (Hoedt *d 4*), Great Sangi (Rosenberg, Hoedt *d 4*, Platen *14*, Nat. Coll.), Talaut Islands — Salibabu and Karkellang (Nat. Coll.), Ternate, Halmahera, Morty, Salawatti, Waigiou (cf. Salvadori *7*, Oates *11*, Kelham *8*, W. Blasius *14*, Kutter *10*).

Count Salvadori includes Burmah (Hume) in his list of localities, but only Tenasserim is noted for it in Mr. Oates' and Mr. Blanford's more recent works.

It is possible to show that this species occurs in the East India Archipelago only as a migrant from China, Ussuriland and Japan during the N. E. monsoon, the winter in the latter countries. Such Mr. Whitehead considered it undoubtedly to be in Borneo *(17)*, and Mr. Everett *(18)* states that "it appears in Labuan and Northern Borneo in September and remains through the winter. It is quite the most abundant of the migratory as *Haliastur intermedius* is of the

resident birds of prey in those parts of the island". Mr. Whitehead also marks it as a migrant in Palawan *(20)*. Abbé David states that it breeds in the mountains near Peking, though it appears not to be plentiful in China *(5)*; further south, it passes through the Lower Yangtse country, as Mr. F. W. Styan writes, "on migration in March and April. A good number travel together, and remain a week or so among the hills on their way; they seem to avoid the plains" *(22)*. Apparently the species is resident, or some remain to breed, in the Philippines, an egg, which appears to belong to this species, having been obtained in Mindanao by Schadenberg and Koch *(10)*. The following recorded dates afford fairly conclusive evidence that this Hawk descends into the East India Archipelago at the beginning of the cold in the northern hemisphere; whither they take their departure again with the returning S. W. monsoon.

	Locality	Specimens	Time of year	Reference
Philippines	Luzon	5 or more	Nov., Dec., Feb., April, July	*2, 19, 21*
	Panay	1 » »	January	*21*
	Guimaras	2 » »	March, December	*2, 21*
	Negros	1 » »	February	*21*
	Cebu	2 » »	March	*3, 21*
	Siquijor	1 » »	February	*21*
	Mindanao	3 » »	October, December, March	*10, 21*, Dresd. Mus.
	Basilan	1 » »	November	*21*
	Cuyo	1 » »	December	*2*
	Palawan	1	November	*4*
	Sooloo Is.	1	December	*13*
Borneo		9	October to March	*17*
Malacca		1	February	*8*
Tenasserim		2	March	*6*
Talaut Is.		8	October, November	Dresd. Mus.
Sangi Is.		7	October to January	*14*
	Great Sangi	1	December	Dresd. Mus.
N. Celebes		4	October, February	*d 4*
N. Celebes		1	December	Dresd. Mus.
N. Celebes		6	October, November	P. & F. Sarasin
Ternate		3	November to February	*7, 12*
Halmahera		3	January, April 1st	*d 4*
Morty		1	January	*d 4*
Salawatti		1	November	*d 4*

From the above list of about seventy specimens, furnishing all the recorded dates which we have been able to find for specimens obtained in these islands, it will be seen that every one was obtained between October and April, except Dr. Steere's notice from Luzon, the northernmost island of the Philippines, which furnished one or more in July. Its prey consists probably almost exclusively of reptiles, amphibia and insects which become scarce or quite disappear in the northern parts of its range on the approach of winter; hence the motive for the autumnal migration.

To explain the returning migration in spring other motives than hunger must be looked for; it is evident that no diminution of food takes place in warm climates at this time of the year, but rather the opposite. It is, however, possible to argue that the influx of northern migrants overstocks these regions, rendering breeding there more inconvenient than in more northern climes, which now also offer a plentiful food supply. This reason goes hand in hand with another one, the remembrance of, and attachment for, the old breeding quarters. Many birds will not forsake their nesting spot, as almost every field-naturalist knows from experience, even after their eggs or young have been taken and nest destroyed; and a pair of the same species — probably, as a rule, the same identical pair[1]) — return year by year to the same spot, even to the same tree or bush.

The Grey-faced Buzzard-eagle has as yet been recorded only from the Northern Peninsula of Celebes, — Gorontalo and the Minahassa. So, likewise, *Tachyspizias soloensis* and *Ninox scutulata japonica* have been recorded only from North Celebes. These are also migratory species, which descend in the winter from China apparently, and reaching North Celebes via the Philippine Islands

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[1]) Some curious cases, showing that it need not follow that it is always the identical pair of parent birds, which returns to the same spot, are recorded by Seebohm in the case of the Merlin *(Falco aesalon)*. A pair of these birds was found breeding on a certain bank and were killed; nevertheless for several succeeding years other pairs of these birds always made their appearance and tried to rear their young on the same bank, though one or both birds were killed off every season (British Birds 1883, I, 38). The only way, as Seebohm thinks, by which these facts may be accounted for, is on the supposition that Merlins have certain recognised breeding haunts, which are seized upon by a pair out of a party in migration, provided the former owners are not already in possession. This may be the case; but it appears to us more probable that the birds, which attempted to nest at the spot, were the young which had been reared there some years earlier and had been expelled from their native haunt by the their parents (or possibly by the more courageous members of the household), the usual occurrence among birds of prey and probably among other birds.

An interesting case in this connection has been communicated to us from personal observation by Mr. W. Schnuse of Dresden. A pair of Storks had nested for a few years on the top of a disused tall chimney in the village of Walternienburg, Province of Saxony. In 1894, three young ones were reared, and the birds left for the winter. Next spring, two Storks, evidently the parents, returned and took possession of the old nest. A day or two afterwards three other Storks arrived and tried to occupy the nest, and tremendous fights took place every day for at least a week for its possession. The three (apparently the young of the former year), which roosted at night on an old disused nest on the parsonage about 200 yards off, at length relinquished their efforts. It is a pity that no one seems to have taken the trouble to amass facts of this description.

Since the above remarks were made, Prof. Newton's thoughtful considerations on the question have appeared (Dict. B. pt. II, 1893, 555), and may well be inserted here. "When we consider the return movement which takes place some six months later, doubt may be entertained whether scarcity of food can be urged as its sole or sufficient cause, and perhaps it would be safest not to come to any decision on this point. On one side it may be urged that the more equatorial regions which in winter are crowded with emigrants from the north, though well fitted for the resort of so great a population at that season are deficient in certain necessaries for the nursery. Nor does it seem too violent an assumption to suppose that even if such necessaries are not absolutely wanting, yet that the regions in question would not supply sufficient food for both parents and offspring — the latter being, at the lowest computation, twice as numerous as the former — unless the numbers of both were diminished by the casualities of travel. But on the other hand we must remember what has been advanced in regard to the pertinacity with which Birds return to their accustomed breeding-places, and the force of this passionate fondness for the old home cannot but be taken into account, even if we do not allow that in it lies the whole stimulus to undertake the perilous voyage".

are content for the most part to pass the cold season there, without going further south.

The next species, *Butastur liventer* — distinguishable by its rufous hazel tail and yellow bill — is perhaps also migratory, but this species has only been found in South Celebes. It is not known from China and the Philippines; its northermost known quarters are Pegu, where it breeds, and hence its wandering probably takes place by way of Malacca and the chain of islands from Sumatra eastwards, so reaching South Celebes before any other part of the island. So, also, *Polioaetus humilis*, likewise a Burmese and Indian species not known in China or the Philippines, has only been obtained in South Celebes (in two examples) and at Peling Island. See also *Lanius tigrinus* and *lucionensis*.

18. BUTASTUR LIVENTER (Temm.).

Rufous-tailed Buzzard-eagle.

a. **Falco liventer** *(I)* Temm., Pl. Col. 1827, Nr. 438.

b. **Buteo liventer** Cuv.; *(1)* Schl., Mus. P.-B. Buteones 1862, 21; *(II)* id., Valkvogels 1866, 33, 69, pl. 21, f. 1; *(3)* id., Rev. Acc. 1873, 111.

c. **Buteo pallidus** Less., Tr. d'Orn. 1831, 82.

d. **Astur liventer** Gray, List. Acc. B. M. 1844, 34.

e. **Poliornis liventer** Kaup; *(1)* Walden, Tr. Z. S. 1872, VIII, 37; *(2)* Hume, Str. F. 1873, I, 318; *(3)* Salvad., Cat. Ucc. Borneo 1874, 9; *(4)* Hume, Str. F. 1875, III, 31; *(5)* Meyer, Ibis 1879, 56.

f. **Circaetus liventer** (G. Müller) *(1)* Kaup, Isis 1847, 267.

Butastur liventer *(1)* Sharpe, Cat. B. 1874, I, 296; *(2)* Hume & Davison, Str. F. 1878, VI, 21; *(3)* Oates, ib. 1882, X, 180; *(4)* id., B. Brit. Burmah 1883, II, 196; Gurney, Diurn. B. of Prey 1884, 73; *(5)* W. Blas., Ztschr. ges. Orn. 1885, 207, 208, 233; *(6)* Everett, J. Straits Br. R. A. S. 1889, 183; *(7)* Oates, Hume's Nests & Eggs 1890, III, 161; *(8)* Hartert, Kat. Vög. Frankf. M. 1891, 176; *(9)* Vorderman, N. T. Ned. Ind. 1892, LI, 375; *(10)* Büttik., Zool. Ergebn. Webers Reise Ost-Ind. 1893, III, 271; *(11)* Blanf., Faun. Br. Ind. B. III 1895, 364; *(12)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 1, p. 7; *(13)* Hartert, Nov. Zool. 1896, 162.

"Buetje", Tjamba, S. Celebes (Platen *5*).

For further references see Sharpe *1*; Salvadori *e 3*; Oates *4*.

Figures and descriptions. Temminck *a I*; Schlegel *b II*; Kaup *f 1*; Sharpe *1*; Hume *e 4*; Oates *3*, *4*, *7*; W. Blas. *5*; Vorderman *9*; Blanford 11.

Adult. Above greyish brown, more rufous brown on upper tail-coverts and scapulars; shaft-streaks dark; primary coverts and remiges hazel-rufous, the inner webs of the latter crossed with about six narrow dark bars, the outer webs for the terminal half ashy brown; tail hazel-rufous crossed with from two to seven narrow bars — the basal ones being sometimes absent; throat whitish; under surface drab-brown like the face, but mottled on the abdomen with broken cross-bars of white; thighs, under tail-coverts and under side of wing white, the dark bars of the quills being rather faint.

"Iris light yellow; eyelids, cere, feet and bill yellow, tip of latter black" (♀, S. Celebes: Platen — Nr. 6738 and others).

Three specimens in the Dresden Museum from Celebes — all of them at the end of the moult — and one in the Sarasin Collection are in this plumage.

Female. Like the male; a little larger perhaps.

Young. Similar to the adult, but the head above brown, with blackish brown shaft-streaks, the wing-coverts mottled with whitish, the grey-brown breast marked to some extent with whitish transverse spots (♂, 11. Dec. 1894, Macassar: P. & F. Sarasin.

A young specimen of three months' age described by Mr. Oates *(3)* had the bars on the tail very clearly defined.

Measurements.	Wing	Tail	Tarsus	Bill from cere
a. (6738) ♀, S. Celebes (Platen)	305	155	63	21
b. (C 11205) ♀, S. Celebes, 6. III. 78 (Platen)	290	162	66	20.5
c. (Sarasin Coll.) ♀, Macassar, 14. VII. 95 (P. & F. S.)	285	150	65	20
d. (C 11204) ♂, S. Celebes, 8. II. 78 (Platen)	285	150	65	20
e. (Sarasin Coll.) ♂ juv., Macassar, 11. XII. 94 (P. & F. S.)	276	146	63	19

Eggs. 2; white, very smooth and compact; seen against the light — clear dark green. Size 46 × 37 mm ca. (Oates *7*).

Nest. Of small sticks, situated in a tree.

Breeding season in Burmah. March *(7)*.

Distribution. Pegu (Oates etc. *e 2, e 4, 4, 7*); Tenasserim (Davison *2*); Siam (Gurney *e 1*); Java (Reinwardt *b 1*); Timor (S. Müller *b 1*); ? Borneo (*b 1, e 3, 6*); South Celebes, — Macassar (S. Müller *b 1*, Wallace *1*, Meyer, Platen *5*, etc.); Pare-Pare (Weber *10*); Luwu, Gulf of Boni (Weber *10*); ? Moluccas (Frankf. Mus. *8*).

Mr. Everett declines to admit this species into his list of the birds of Borneo for want of sufffcient evidence, nor have we seen any reference to actual specimens from that island. If the locality be correctly indicated, there is a specimen in the Frankfurt a. M. Museum from the Moluccas — apparently the only one as yet recorded east of Celebes. For the present it should be treated as erroneous; no collector is mentioned.

There is some reason to suspect that this Hawk will prove to be a partially migratory species in the East Indian Archipelago. In lower Burmah it is abundant, and breeds there, laying 2 eggs in March. In Java a note of Mr. de Bocarmé states that it is generally seen in December and January and appears not to nest in that island. It is fairly abundant in marshes and damp meadows; preys upon frogs, grasshoppers and small birds, also snakes and crabs *(b 1, 4)*. One specimen from Java in the Leyden Museum is dated May. Five specimens reported upon by Prof. W. Blasius *(5)* and another one in the Dresden Museum were shot by Dr. Platen in February, March and April 1878; and one was obtained near Macassar by Meyer in October, 1871[1]).

Prof. Weber obtained four in the southern Peninsula, one in October, one in February, and the other two apparently prior to October *(10)*.

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[1]) This specimen, which is in the Berlin Museum, was erroneously entered in the Catalogue there as having come from Manado, although it is labelled "Macassar, Oct. 1871". This mistake has led to the locality Manado being recorded for the species in Ibis 1879, 56, which should now be cancelled and Macassar substituted in its place.

Mr. Everett, who arrived at Macassar on September 16th, 1894 *(13)*, sent specimens to the Tring Museum and reported it to be common. Drs. Sarasin, as shown above, obtained a young male in December, 1894, but a female in worn plumage in July, 1895. It is thus clear that the species occurs in Celebes all the year round, though it may be more plentiful in the months of the northern winter.

This species appears to be an inhabitant of the plains, and its presence in the southern Peninsula up to Luwu at the head of the Gulf of Boni is an interesting fact when contrasted with the occurrence of its fellow-species *B. indicus* in the north of Celebes, while the latter is absent in the south. Whether *B. liventer* visits S. Celebes on migration or not, there is no doubt that it came into the island from the south-west, while *B. indicus* comes to N. Celebes every autumn from the north-west.

Buteo desertorum Vieill.

A single specimen in the Leyden Museum labelled North Celebes (v. Faber, 1883). According to Dresser (Birds of Europe V, 458) the range of this species is over South-East Europe, Africa and India — the Neilgherries and Himalayas (Hume, Rough Notes, 270); in winter it has occurred as far south as Ceylon and Thatone in Tenasserim (VII.—X. orn. JB. Sachs. 1886, p. 2), so that its occurrence in Celebes is well within the bounds of possibility. Faber collected only in Celebes and Sumatra.

GENUS HALIASTUR Selby.

The Brahminy Kite is of medium size, wings long, reaching nearly to the tip of the tail (Legge); tail moderate, rounded; tarsus short, about one-eighth the length of the wing, upper third feathered, bare part with transverse shields in front; toes short, claws somewhat small and not much bent. Devours animal food of almost any description. A single, stationary species, occurring from India to Australia. Lays 2 eggs.

+ 19. HALIASTUR INDUS (Bodd.).

Brahminy Kite.

This species ranges in great abundance from the Indian countries and Ceylon, throughout the East India Archipelago as far as New Guinea and the Solomon Islands, to Australia.

As it extends its range from India eastwards and southwards, it diminishes in size and the dark shaft-streaks on the white plumage of the head, neck and breast gradually diminish in breadth, until in New Guinea and the neighbouring

islands they quite disappear. In India and Burmah the stripes are broad and take in some of the web of the feather on either side of the shaft; in Ceylon, Siam, Malacca and Sumatra the stripes are generally narrower, a further decrease is seen in specimens from Java, Sumbawa, Sumba, Flores, Borneo and the Philippines, where the streaks appear to be confined to the shafts, which are very distinct and black, and Javan specimens were named intermedius by the late J. H. Gurney; a little more East a still further decrease in the dark shaft-streaks is to be seen in specimens from Sangi, Celebes, Sula, Halmahera, Obi major, Amboina, Buru, Timor, and North Australia, where the dark shaft lines are, as a rule, thin and scanty, or are quite absent, leaving the head, neck and breast pure white; in New Guinea and the surrounding islands, New Ireland, Solomon Islands and Aru, these parts are, apparently, in general, pure white, and this most eastern form of the species has received the name *girrenera* from Vieillot. But the species is so plentiful throughout its range, and the transition from the broad-striped specimens of India to the white ones of New Guinea is so gradual and regular that it is impossible to draw any distinct lines of demarkation between specimens from neighbouring localities; and any geographical sections of the whole which have been called by distinct names are, by definition, only subspecies, or even subsubspecies.

In how far is it practically profitable to distinguish local sections of this species by name, and what form of nomenclature is convenient? According to the most prominent present-day definition of ornithologists, species are well-differentiated groups of individuals which are not connected with one another by means of a series of intermediate intergrading forms, whereas subspecies are interconnected by such a series of intermediate forms. Just as a genus is always known under a single name, so also a species should always be known under a binomial, and subspecies under trinomials. In the present case of *Haliastur indus*, it seems advisable to recognise at least the two extreme forms of the species, as subspecies, viz: the typical race of India with the broadest stripes, and that of New Guinea without any stripes. Unhappily, modern rules of nomenclature make no provision for distinguishing as a subspecies the local race first described, and we are compelled to speak of both the species as a whole, and of the typical subspecies, as *Haliastur indus* (Bodd.). Granting that it be worth the trouble to recognise subspecies at all by name, it is certainly adventageous that one and all should be spoken of under trinomials in order to distinguish them from species, of which they only represent a part. This might readily be done by strictly confining the original binomial to the species, as at present defined, and then adding the word typicus to the typical subspecies first described, but it is not yet advisable to employ this method, inasmuch as — until some rule of nomenclature be made to prevent this result — the name of the writer, who appended the word typicus to the originally described race, would be likely to be quoted by any one writing down the trinomial hereafter and the name of the true author overlooked. In referring to such subspecies

we are, therefore, compelled to attach the vernacular term "the typical", to the scientific name of the species, instead of adding a classical trinomial[1]).

Haliastur indus arouses another question in nomenclature. If subspecies be distinguished by a trinomial, under what form of nomenclature are the forms which interconnect them to be spoken of? In the present case, if the two extreme races only of *H. indus* are treated of as subspecies, the main body of the species is made up of intermediate forms. Specimens from Java, which stand in characters about midway between those of India and New Guinea, have been named *intermedius* by Gurney; and those of Celebes which are again intermediate between the latter and those of New Guinea were named *H. indus* var. *ambiguus* by the late Dr. Brüggemann, but the last named, like those intermediate between *intermedius* and the typical *indus*, cannot be regarded as more than subsubspecies; and if such a subdivision ever come into use four names must be employed for it. In such a case it is certainly much easier to remember the facts than the names which are intended to call them to mind, and the nomenclature employed would defeat its own purpose. Therefore we prefer to give no long names, but to designate the forms intermediate between the typical *H. indus* and *H. indus — girrenera* in the following manner: *Haliastur indus — girrenera*, with the remark that a long hyphen connecting the names of two subspecies serves to designate the intermediate forms which connect them[2]). It does not appear to be advisable to recognise *H. indus intermedius* as a third subspecies, since this is not aberrant, but distinctly intermediate between the two extremes of variation in *H. indus*.

Perhaps in future — when the want becomes sufficiently pressing to necessitate the step — a somewhat considerable change in the nomenclature of the present day may be effected as follows: species as at present defined will remain under their original binomials; subspecies under trinomials; but the degree of relationship between the interconnecting forms to these subspecies will be displayed by the use of numbers — somewhat after the manner of chemical formulae. Thus, in the case of *Haliastur indus* — taking four degrees of relationship into consideration — the typical subspecies will be *Haliastur indus typicus*, that of New Guinea *H. indus girrenera*; that of Celebes, which may be supposed to have three times as strong a connection with *girrenera* as with *typicus*, will be represented as *H. indus*$_1$ *girrenera*$_3$; that of Java being just about midway in characters as *H. indus*$_2$ *girrenera*$_2$; that of Malacca as *H. indus*$_3$ *girrenera*$_1$. This method could be carried to any degree of refinement, and

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[1]) Since this article was written, Dr. Jordan and Mr. Hartert have published some very similar remarks in the "Novitates Zoologicae" and in "The Ibis". Mr. Hartert, however, did not hesitate to append the classical trinomial typicus to the typical form, but he has since decided that a doubling of the specific name (e. g. *Acredula caudata caudata*) is better (Zool. Anzeiger 1897 XX, 41—47). It must be left to a general agreement, which mode of expression be adopted, the one being nearly as good or bad as the other.

[2]) We are not so sanguine as to believe, that our brother ornithologists will adopt our innovation of nomenclature, but we trust that future "rules of nomenclature" will also take into consideration cases like this, and make some proposition which can be generally adopted.

is certainly less complex than the use of a quadrinomial such as *Haliastur indus girrenera ambiguus*.

Better suited to the ornithological needs of the present day, so long as mathematical accuracy which may be expressed in numbers is generally impossible, are the signs $>$ and $<$, as explained in a subsequent article. We use them as follows:

Haliastur indus $>$ *girrenera* means that the specimen so indicated is more like the typical *indus* than *girrenera* (viz. ordinary birds from Ceylon, Sumatra etc.);

Haliastur indus $<$ *girrenera*, more like *girrenera* than *indus* (Celebes etc.);

Haliastur indus $=$ *girrenera*, sharing equally the characters of *indus* and *girrenera*, intermediate (Java, etc.).

Haliastur indus — girrenera.

a. **Haliastur indus** partim *(1)* Schl., Mus. P.-B. Aquilae 1862, 19; *(II)* id. Valkv. 1866, pl. 4, fig. 4; *(3)* id., Rev. Acc. 1873, 119—123; *(4)* Salvad., Ucc. di Borneo 1874, 12; *(5)* Lenz, J. f. O. 1877, 366; *(6)* Legge, B. Ceylon 1880, 76; *(7)* A. Müller, J. f. O. 1882, 428; *(8)* Hartert, J. f. O., 1889, 405; *(8bis)* Hagen, Td. Ned. Aard. Genoots. 1890 (2), VII, 130; *(9)* Vorderman, Notes Leyden Mus. 1891, 122; *(10)* M. & Wg., J. f. O. 1894, 238; *(11)* iid., Abh. Mus. Dresd. 1895, Nr. 8, p. 4; Nr. 9, p. 2; *(12)* iid., ib. 1896, Nr. 2, p. 7.

b. **Haliastur intermedius** (Gurney), subsp.; *(1)* Sharpe, Cat. B. 1874, I, 314; *(2)* Gurney, Ibis 1878, 460—466; *(3)* id., Diurn. B. of Prey 1884, 79.

c. **Haliastur intermedius** Gurney; *(1)* Walden, Tr. Z. S. 1875, IX, 142; *(2)* Salvad., Orn. Pap. 1880, I, 19; *(3)* Meyer, Verh. z.-b. Ges. Wien 1881, 760; *(4)* Guillem., P. Z. S. 1885, 253; *(5)* id., t. c. 502; *(6)* id. t. c. 562; *(7)* Sharpe, Ibis 1889, 74; *(8)* Everett, J. Str. Br. R. A. S. 1889, 183; *(9)* Steere, Coll. B. Philip. 1890, 7; *(10)* Salvad., Ann. Mus. Civ. Gen. 1891, 41; *(11)* Sharpe, Ibis 1894, 244, 258; *(12)* Grant, t. c. 407; *(13)* Bourns & Worces., B. Menage Exped. 1894, 33; *(14)* Vorderman, N. T. Ned. Ind. 1895, 329, 333; *(15)* Grant, Ibis 1895, 438; *(16)* Everett, Nov. Zool. 1896, 597.

d. **Haliastur indus** var. **ambiguus** *(1)* Brüggem., Abh. Ver. Bremen 1876, 45; *(2)* Büttik., Zool. Ergebn. Webers Reise Ost-Ind. 1893, III, 271.

e. **Haliastur leucosternus** Walden; *(1)* Meyer, Ibis 1879, 56; *(2)* Joest, Das Holontalo 1883, 105.

f. **Haliastur girrenera** var. **ambigua** *(1)* Salvad., Orn. Pap. 1880, I, 17; *(2)* W. Blas., J. f. O. 1883, 135; *(3)* id., Ztschr. ges. Orn. 1885, 227; *(4)* id., Ornis 1888, 542.

g. **Haliastur girrenera** *(1)* Meyer, Isis 1884, 9.

"Asiare" or **"Kasihare"**, adult; **"Jamba"**, young, Talaut Is., Nat. Coll.

"Kasiahe", Siao, Tagulandang and Ruang, **"Kasiaheng"**, Gt. Sangi, iid.

"Koheba mera", Banka Id., N. Cel., iid.

"Koheba dada puti" i. e. Bird of Prey with white breast, Malay vernacular of Celebes, Meyer *e 1.*

"Bulia", Gorontalo, Joest *e 2.*

"Tjangeh", Tjamba, Maros, S. Celebes, Platen *f 3.*

"Alaij pau", Peling Island, Nat. Coll.

For further references see Sharpe *b 1, c 7.*

Figures and descriptions. Schlegel *a II, a 1, a 3*; Sharpe *b 1*; Brüggemann *d 1*; Lenz *a 5*; Gurney *b 2* (specimens described from Sumatra, S. Borneo, Flores, Macassar, Togian Islands, Amboina, N. E. Australia); A. Müller *a 7*; Meyer *g 1*; W. Blasius *f 3, f 4.*

Adult. Head, neck, breast and upper part of abdomen white, marked to a greater or less extent with dark shaft-streaks, which are broad — but narrower than in the typical *H. indus* — in the western parts of its range, and gradually become fine and scanty in the eastern parts; primaries black, passing into cinnamon-chestnut towards the bases of the feathers; all other parts cinnamon-chestnut, whitish at the tip and on the under side of the tail. "Bill bluish white; feet citron-yellow" (Platen *f 3*). Iris variable — probably with age: dark chocolate, warm chocolate, olive-brown, brown, light brown, dull yellow, reddish yellow (Gurney *b 2*, Sharpe *c 7*, W. Blasius *f 4*).

Young. The white of the adult replaced by cinnamon, whole under surface of this colour.

Measurements after Legge, Salvadori and Gurney. Wing 345—406 mm, tail 170—241, tarsus 46—57, bill from cere 28—31. The smallest measurements are generally those of the most eastern parts.

Distribution of intermediate specimens. Ceylon (Legge *a 6*); Malacca (Sharpe *b 1*); Salanga (A. Müller *a 7*); Sumatra (Gurney *b 2*; Salvad. *c 10*); Bangka (Schl. *a 3*); Billiton (Vorderman *a 9*); Java (Schl. *a 3*, Sharpe *b 1*); Lombok (Vorderman *c 14*); Sumbawa (Guillem. *c 4*); Sumba (Meyer *c 3*); Flores (Gurney *b 2*); Timor (Wall. *b 1*); Philippines (Schl. *a 3*, Meyer *c 1*, Steere *c 9*); Sooloo Islands (Guillem. *c 4*); Borneo (Schl. *a 3*, Everett *c 8*); Talaut Is. (Nat. Coll. *a 10, a 11*); Great Sangi (Platen *f 4*, Nat. Coll.); Siao (Hoedt *a 3*, Meyer *g 1*, Nat. Coll.), Tagulandang and Ruang (Nat. Coll.); Celebes — North (Forsten, Rosenb. *a 1, a 3*, Meyer *e 1, etc.*), — S. W. Peninsula, Macassar (Wallace *b 1*); Maros and Tjamba (Platen *f 3*), Tete Adji (Weber *d 2*); Peling (Nat. Coll.); Sula Besi (Hoedt *a 3*); Buru (Wallace *b 1*); Amboina (Schl. *a 3*); Obi Major (Guillem. *c 4*); Halmahera (Meyer in Dresd. Mus.); Australia (Gurney *b 2*, Ramsay).

In the west and east extremes of the range given above normal specimens of the typical *H. indus* and of *H. indus girrenera* respectively occur intermingled with others that are not normal. Thus, in Malacca, Mr. Hume records a specimen with the dark streaks as strongly developed as in any Indian specimen (Str. F. IX, 1880, 120); Colonel Legge, on the other hand, regards the Malaccan birds as further removed from the Indian than are the Cingalese ones, which he considers intermediate between the two. It is very probable that in Malacca, and elsewhere, an influx of specimens from the north takes place in winter, for, as is pointed out by Gurney, Abbé David notes a migratory movement among the birds of Tchékiang and Kiangsi: "il disparait de ces provinces pendant l'hiver et se retire dans la Cochinchine" (David and Oust. Ois. Chine, 15), but it is not certain to what race the Chinese birds belong. In Halmahera, Amboina, Celebes, etc. pure white plumage on the head, neck and breast is common; from Flores, also, such a bird is mentioned by Schlegel *(a 3)* and we have recently received an almost typical *girrenera* from Talaut *(a 10)*. The most logical way of treating such specimens is to record them under the

name of the normal subspecies, *H. indus girrenera* or the typical *indus*, as the case may be; while those which deviate from these subspecies in the same localities should bear the sign, *H. indus—girrenera.*

As regards animal food, *H. indus* seems to be almost omnivorous. Fowls, fish, lizards, molluscs, crustaceans, large orthoptera, refuse of ships, are noticed by Gould, Schlegel, Jerdon, Legge etc.; and Pryer observed it catching bats and Edible-nest Swifts on the wing in front of the great *Collocalia* caves of British North Borneo (P. Z. S. 1884, 536). Probably, its feeding habits vary somewhat in different localities; in Ceylon, for instance, although Mr. Layard has known it to seize a fowl, "this must be a rare occurrence" (Legge), whereas the more narrowly striped specimens of Java carry off domestic fowls daily (Bocarmé), and in Borneo Mr. Whitehead found it to be a great robber of chickens. The species builds in trees, and throughout its dominions — from India to Australia — the ordinary number of eggs laid at a sitting is two. North and south of the equator the breeding seasons are different, as would appear from the following:

North of equator.

Locality	Season	Eggs	Authority
India	Jan.—April	2 (or 3)	Oates, Nests and Eggs Ind. B. III, 170.
Burmah	Dec.—Feb.	2—3 .	Oates, B. Brit. Burmah.
North Ceylon	Dec.—Feb.		Parker, Ibis 1883, 193.
South Ceylon	Feb.—Mch.	2 . .	Legge, B. Ceylon, 76.
Labuan	Dec. 1873	1 . .	Sharpe, P. Z. S. 1879, 323.

South of equator.

Java	May—June	2 . .	Schl., Valkv. 10, 51.
Australia (Port Essington)	July—Aug.	2 . .	Gld., B. Austr., text, pl. 4.

It is, of course, not to be supposed that any abrupt difference in the breeding seasons is to be found N. & S. of the equator. In Tenasserim lat. 16° N., for instance, Colonel Bingham noticed a pair breeding, "but the nest, when examined on the 4th April, was still unfinished", this being only about a month earlier than in the case with the species in Java. In such countries as lie in the more immediate neighbourhood of the equator and which experience no very great difference of temperature at any time of the year, it may ultimately prove that the breeding-seasons of the birds are mainly influenced by the character of the monsoons — wet or fine; Legge states that in Ceylon (B. Ceyl. p. XXIII) birds breed during the rains, the times varying on opposite sides of the island. The most important condition probably is that the food supply be at its maximum when the young are hatched.

It will be noticed in the above list that an egg obtained at Labuan was taken in December, while in Java the species lays in May and June, that is nearly half a year later; at Labuan December is the final month of the rainy season; May in Java is at the beginning of the fine season.

In almost all parts of its range *H. indus* exists in great abundance. Thus, it is spoken of as a very common species at Macassar (v. Rosenb.), in N. Celebes

(Meyer), in Ceylon (Legge), "extremely common in Burmah" (Oates), "excessively common in Tenasserim" (Davison), "everywhere abundant on the strand in Ceram" (Ribbe); "the most plentiful resident bird of prey in Borneo" (Everett), "the commonest bird of prey near Batavia" (Vorderman), "the commonest and most impudent bird of prey" in Sumatra (Hagen). Owing to its great numerical abundance, to the expulsion of the young by the parents, the search for partners and for suitable breeding territories well supplied with food, a continuous crowding out of the surplus population of this species doubtless takes place, and the movement is as nothing to a bird possessing such fine power of flight. It is, however, naturally a stationary bird, having no call for migration by reason of its omnivorous habits; consequently, it does not proceed farther, when forced to make a move, than to the nearest suitable locality; but this serves to keep up a continuous intermixture of individuals from neighbouring quarters, so as to prevent its becoming marked off into distinct smaller species. Why, in spreading from the continent of Asia to the islands of the East, *H. indus* has gradually lost the black shaft-streaks on the white plumage of the head, neck, breast and abdomen, so acquiring a pure white on these parts (or — vice-versa — has acquired black shaft streaks in extending its range from New Guinea to India [see p. 64 *antea*]) are questions worthy of consideration, but the explanation of which must be left to future time, if the development of this species as a whole has not by then undergone changes, be it that it has split into sharply separated forms or that it has settled down into one.

GENUS MILVUS Cuv.

The Kites are medium-sized birds of prey and well characterized by their long, forked tail. Wing very long; tarsus and toes short, upper third of the tarsus feathered, lower part in front transverse-scutate, claws not strongly hooked; bill rather weak, culmen narrow, compressed, tomia slightly festooned. Preys on small vertebrates of any description; also, carrion. Three to six species found in the Old World, including Australia; migratory and stationary; laying 2—3 eggs.

20. MILVUS MIGRANS (Bodd.).

Black Kite.

The following references bear upon what may be called the Indian Kite-question:

Homeyer, J. f. O. 1868, 252; Anderson, P. Z. S. 1872, 79; Hume, Str. F. 1873, 160; Brooks, Ibis 1874, 461; Sharpe, Cat. B. I, 1874, 323—326; Anderson, P. Z. S. 1875, 25; Brooks, Str. F. 1875, 229; Hume, l. c. note; Hume & Davison, Str. F. 1878, VI, 23; Oates, Str. F. 1878, VII, 44; Gurney, Ibis 1879, 76—82; Brooks, t. c. 282—284; Scully, Str. F. 1879, VIII, 227—229;

Brooks, t. c. 466, 467; Hume, l. c. note; Legge, B. Ceylon, 82; Scully, Str. F. 1881, X, 95; Oates, S. F. 1882, X, 181; id., B. Brit. Burmah 1883, II, 202—204; Seebohm, British B. I, 1883, 80; Gurney, Diurn. B. of Prey 1884, 80, 81; Brooks, Ibis 1884, 238; Menzbier, t. c. 311, 312; W. Blas., Ztschr. ges. Orn. 1885, 230—232; Brooks, Ibis 1885, 385, 386; Tristr., Cat. Coll. B. 1889, 63, 64; Zaroudnoi, Bull. Ac. Imp. Mosc. 1889, 755; Oates, Hume's Nests and Eggs 1890, III, 173—177; Blanford, Faun. Brit. Ind. B. III 1895, 374—378.

The controversy referred to above, after having lasted over a period of a quarter of a century and produced written matter enough to fill an octavo volume, remains almost as far as ever from a satisfactory settlement. It still needs years of close and accurate observations, agreeing, moreover, better in themselves than is at present the case, before any decided opinion upon the Indian Kite-question can be formed. The points in dispute may be stated as follows: on the one side Mr. Hume and others maintain that there are three forms of Black Kite in India — a big one (*M. melanotis* T. & S.), a middle-sized one (*M. govinda* Sykes) and a small one (*M. affinis* Gld.); the other side, which may be identified with Mr. Brooks' name, affirms that the middle-sized and the small Kite of Hume are one and the same, and that the big Kite — and not this species — is the true *Milvus govinda* Sykes.

Taking first into consideration the question of transferring the name, *M. govinda*, to the large Kite, we believe that no sound and sufficient reason can be urged to necessitate this step. The only strong argument in its favour is, that one of Sykes' types in the possession of Mr. Brooks is undoubtedly a specimen of the large Kite. But the weight of this argument is counterpoised by the fact that Sykes was not aware that there were two races of Kite in India, and that at least one other specimen said to be a type is in preservation elsewhere (see Legge l. c.) and belongs to the smaller, commoner, race. This in itself would be sufficient reason for declining to make an inconvenient change in nomenclature, but, beyond this, though the original description applies equally well to either form as regards coloration, the accompanying measurement of the tail (11 in.) betoken that it was made from a small specimen of the smaller Kite. Mr. Brooks urges that the body — 26 in., the only other measurement given — is that of the large Kite, but there is reason to believe that these measurements were not made from a freshly killed specimen, but from a skin, in which case — though that of the tail holds good — that of the body is, of course, of no value whatever as a discriminative character[1]). That the description was made from a skin is proved first from the fact, as Mr. Hume has pointed out, that Sykes' paper was written in England; and, secondly, that no naturalist would be likely to take the measurement of the tail alone of a specimen before skinning (which can be done equally well afterwards), and neglect to note down the sex, colours of soft parts and expanse, which cannot be ascertained at any

[1]) Of two skins of *Loriculus stigmatus* before us one measures 123 mm and the other 187 mm, or half as long again as the former, though in the flesh no doubt they were about equal in size.

other time. Also, the habits of *M. govinda* as described by Sykes appear to be those of the smaller Kite (cf. Legge). Thus, as regards nomenclature, the smaller Kite has the stronger claim to the name *govinda*, under which it is most commonly known.

Next, touching the question of the occurrence of two forms of small Kite in India, or of only one, it would be impossible — without a great quantity of material and without a much more accurate knowledge of the habits of these birds in India and elsewhere than can be obtained from the imperfect and, sometimes, conflictory statements of field naturalists — to offer any solution of the matter in dispute; nevertheless we would throw into the discussion a fresh element, which may not be without effect upon the knotty points concerned.

It should be borne in mind that *M. govinda* and the large *melanotis* are only worthy of subspecific separation from *M. migrans* of the western Palaearctic Region. In India the two forms possibly do not intergrade; after most accounts they differ in habits; the large Kite is a hill-race breeding in the Himalayas, and, though *M. govinda* breeds there as well, it would seem possible that this form generally lays somewhat later than the other, judging from the statement in "Hume's Nests and Eggs" 1890, III, 173, 176, that *M. govinda* usually lays in the Himalayas in April and May, and *M. melanotis* from January to the beginning of May. The differences between *M. govinda* and a supposed smaller race, occurring in India and generally spoken of as *M. affinis*, are by no means so well made out by the supporters of this view. It is inconceivable that a race, hardly separable from *M. govinda* at the best, should occur as an independant breeding bird intermingled with the latter, and it still remains to be shown whether a smaller race migrates from Burmah or elsewhere at certain seasons[1]), or whether the slight differences of coloration commonly found in larger and smaller Indian specimens are not the natural accompaniment of a slight individual increase or diminution of size. In the cases of *govinda* and *affinis* any movements taking place will be likely to be of a very local character, depending upon the abundance of food; true migrations are hardly to be expected, as the bill of fare of Kites is a somewhat broad one, and in warm countries, like those under consideration, some kind or other of food palatable to it must always be present. There is evidently a difference at least of size between the race of Australia and that of Burmah, which is spoken of by Mr. Oates and others as *affinis*. As is pointed out below, facts tend to show that the Burmese specimens lay a somewhat larger egg. The Australian specimens in the British Museum are also on the whole somewhat more rufous than Indian or Tenasserim ones. Also Legge points out that his Cingalese specimens of *M. govinda* differed as adults from a Macassar example of *affinis* in the less rufous coloration of the head, hind-neck, and lesser wing-coverts, and, in youth, in the less rufescent character of the upper-surface tippings; also there are differences between the

1) See Anderson, P. Z. S. 1872, 79.

Cingalese *Milvus* and the typical Indian *M. govinda*, — facts pointing to the stationary habits of these birds. *M. govinda*, however, as well as the typical *migrans*, visits Afghanistan in migration (St. John, Ibis 1889, 153).

Thus, we conclude, that there are neither two nor three species of Kite in India, but two (or three) subspecies, one of which proceeds to further racial variation in other localities — Ceylon, Celebes, Australia.

For the present it seems best to treat of *M. migrans* as consisting of four subspecies — *Milvus aegyptius* being accounted distinct — viz.:

1. The typical Milvus migrans (Bodd.).

Diagnosis. Size medium (♀ wing c. 430 mm); the edges of the feathers of crown and nape whitish instead of light brown or rufous; abdomen more distinctly ferruginous; usually little or no mottling or banding on the basal portion of the quills in adults. (Blanford, Faun. Br. Ind., B. III 1895, 378.)

Distribution. Europe, N. W. Africa, Asia east as far as Tomsk on the Obi, Turkestan, Afghanistan.

2. Milvus migrans melanotis (Temm. & Schl.).

Diagnosis. Size large (♀ wing 485—546 mm); feathers of head edged with tawny or rufous; usually a conspicuous white patch on wing below at base of quills; abdomen and under tail-coverts usually much paler than in the next form.

Distribution. East Siberia, Japan, India, Burmah; Borneo (Everett).

3. Milvus migrans govinda (Sykes).

Diagnosis. Size medium (♀ wing 430—495 mm, Blanford); head as in *M. m. melanotis*; plumage browner than in *M. m. affinis*.

Distribution. Afghanistan, India, Ceylon, gradually blending with the next form from Burmah to New Guinea.

4. Milvus migrans affinis (Gould).

Diagnosis. Size small (wing about 400 mm, Australia), plumage more rufous than in *M. m. govinda*.

Distribution. Australia, passing into the preceeding form in the localities between Australia and India.

These intermediate birds will be contained under the formula *M. migrans govinda — affinis*, should a special term for them be thought necessary. For the present we prefer to take the birds ranging from Australia to Burmah as one subspecies:

† Milvus migrans affinis (Gld.).

a. **Milvus affinis** *(1)* Gld., P. Z. S. 1837, 140; *(II)* id., B. Austr. 1848, I, pl. 21; *(3)* Schl., Mus. P.-B. Milvi 1862, 3; *(IV)* Diggles, Orn. Austr. 1866, pt. I; *(V)* Schl., Valkv. 1866, 30, 67, pl. 20, f. 1; *(6)* Wall., Ibis 1868, 16; *(7)* Sharpe, Cat. B. 1874, I, 323; *(8)* Hume & Davison, Str. F. 1878, VI, 23; *(8 bis)* Gurney, Ibis 1879, 76—82; *(8 ter)* Hume, Str. F. 1879, VIII, 45; *(9)* Legge, B. Ceylon 1880, 82; *(10)* Salvad., Orn. Pap. 1880, I, 21; Oates, Str. F. 1882, X, 181(?); *(11)* id., B.

Brit. Burmah 1883, II, 202(?); *(12)* Brooks, Ibis 1884, 238(?); id., ib. 1885, 385(?); *(13)* W. Blas., Ztschr. ges. Orn. 1885, 230—232; *(XIV)* North, Nests & Eggs Austr. B. 1889, 10, pl. IV, f. 5, 6 (eggs); *(15)* Oates, Hume's Nests & Eggs 1890, III, 176(?); *(16)* Büttikofer, Notes Leyd. Mus. 1892, 197; *(17)* Newton, Dict. B. 1893, 491; *(18)* Büttik., Webers Reise in Ost-Ind. 1893, III, 271; *(20)* Vorderman, N. T. Ned. Ind. 1895, LIV, 329, 332.

b. **Milvus migrans** pt. *(1)* Schl., Rev. Acc. 1873, 126.

c. **Milvus govinda? affinis** *(1)* Gurney, Diurn. B. of Prey 1884, 81.

d. **Milvus migrans affinis** *(1)* Hartert, Nov. Zool. 1896, 598.

"Latjana", S. W. Celebes, Platen *a 13*.

For further references see Salvadori *a 10*.

Figures and descriptions. Gould *a II*; Schlegel *a V*, *a 3*; Diggles *a IV*; North a *XIV*; Sharpe *a 7*; Legge *a 9*; Salvadori *a 10*; Oates *a 11*; W. Blasius *a 13*; Eyton, Osteol. Av. 1867—75, 3, 7 (sternum).

Adult. Head and neck broccoli brown, marked with dark shaft-streaks; chin, upper throat and ear-coverts whitish with dark shaft-streaks; rest of upper surface sepia brown, the feathers margined (on the wing-coverts strongly washed) with the colour of the head; tail — in young specimens plainly, in old specimens indistinctly — crossed with numerous dusky bars; under surface bistre brown with dark shaft-streaks, darkest on the under wing-coverts and lightest on the under tail-coverts and thighs, longest under wing-coverts grey-brown, with dark bars; primaries black, washed and mottled with pale brown towards the base of the wing, whitish at the concealed base of the outer quills (♀, S. Celebes 26. I. 78: Platen, C 11110, and others).

"Iris brown; cere light yellow; bill black; feet citron-yellow" (Platen *a 13*).

Younger birds have a more mottled appearance than those fully adult, owing to the pale margins of the feathers being more distinct and the banding of the tail strongly expressed.

Measurements.

	Wing	Tail	Tarsus	Bill from cere
a. (6750) ♂, S. Celebes (Platen)	420	315	54	—
b. (Sarasin Coll.) ♂, Macassar, 13. VII. 95 (P. & F. S.)	405	260	54	24
c. (C 11110) ♀, Macassar, 26. I. 78 (Platen)	437	310	56	—
d. (C 11109) ♀, S. Celebes, 5. V. 78 (Platen)	410	265	55	—
e. (Sarasin Coll.) ♀, Macassar, 13. VII. 95 (P. & F. S.)	400	260	53	24

Eggs. Australia; 3; dull white ground-colour, with reddish irregular spots and dots: mean of two measured 45.5 mm × 37.8 (North *a XIV*). Burmah; usually 3; egg-lining bright green; shell tolerably smooth and glossless, dull white, marked and blotched with rust colour, bright in the majority, but pale in a few. Average of 12 eggs: 53 × 41.4 mm (Oates *15*).

It would thus appear that the Australian bird usually lays a considerably smaller egg.

Nesting season in Pegu from the 3rd week in January to the end of March. Nest composed of twigs, etc. situated in a tree.

Distribution. Australia (Gould *a 1*, etc.); Yule Island (D'Alb. *a 10*); Duke of York Id. (Ramsay *a 10*); Timor (S. Müller *a 3*, Wallace *a 6*); Sumba (ten Kate *a 16*); S.W. Celebes — Macassar (S. Müller *a V*, Bernst. *b 1*, Wallace *a 6*, etc.), Tjamba (Platen *a 13*), Tete Adji (Weber *a 18*); N. Celebes — Manado (Faber in Leyden

Mus.); Lombok (Vorderman *a 20*, Everett *d 1*); Sumatra (S. Müll. *a 3*); Singapore (Davison *a 8*); Malacca (Davison *a 8*, Hume *a 8ter*); Tenasserim (Davison *a* 8); Cochin China (Gurney *a 8bis*); Burmah (Oates *a 11*).

For some reason the Black Kite is very local, rather than rare, in the East Indian Archipelago. It has never been met with in the majority of the islands. In Celebes, notwithstanding the amount of collecting done in the Minahassa and Gorontalo, it had not been found there until 1883, when v. Faber sent a specimen from Manado to the Leyden Museum. In the southern end of the south-western Peninsula, as in Timor, S. Müller notes that it is very common about the mouths of the rivers *(a V)*. Whether it is a migrant from Australia here, or a resident, there is insufficient evidence to show, but the latter view is the more probable one, since it appears probable that Australian birds are a little smaller, and more rufous. The food of this species consists of any such birds, small mammals, reptiles, fish, etc. as it can catch and kill; also, carrion.

GENUS ELANUS Sav.

The Black-shouldered Kites are of small-medium size and easily distinguishable by their coloration — bluish grey above, with most of the wing-coverts black and white under parts; also by the long, pointed wing, with the 2nd primary longest; tarsus with the upper two-thirds in front feathered, the lower part covered with small polygonal scales; tail long, very slightly forked; bill compressed in front, the nostrils oval, protected by the loral bristles. Preys upon insects; also small land-vertebrates. Four species, two at least of doubtful validity, found in the warmer parts of both the Old World and America. Eggs 3—5.

+ 21. ELANUS HYPOLEUCUS J. Gd.

East Indian Black-shouldered Kite.

a. **Falco melanopterus** Horsf. (nec Daud.), Tr. L. S. 1822, XIII, 137.

Elanus hypoleucus *(1)* Gould, P. Z. S. 1859, 127; *(II)* id., B. Asia vol I, pl. 12 (1860); *(3)* Sclat., P. Z. S. 1863, 207; *(4)* Wall., Ibis 1868, 17; *(5)* Gray, HL. 1869, I, 28; *(6)* Wald., Tr. Z. S. 1872, VIII, 36; *(7)* Schl., Rev. Acc. 1873, 130; *(8)* Sharpe, Cat. B. 1874, I, 338; *(9)* Salvad., Ucc. Borneo 1874, 12; *(10)* Wald., Tr. Z. S. 1875, IX, 142, 249; *(11)* id., P. Z. S. 1877, 757; *(12)* id., ib. 1878, 939; *(13)* id., ib. 1879, 69; *(14)* Meyer, Ibis 1879, 56; *(15)* Salvad., Ann. Mus. Civ. Gen. 1879, 173; *(16)* Sharpe, Ibis 1879, 236; *(17)* id., P. Z. S. 1879, 314; *(18)* Gurney, Ibis 1879, 333; *(19)* Nicholson, ib. 1881, 140; *(20)* id., ib. 1882, 67; *(21)* Vorderman, N. T. Ned. Ind. 1882, XLI, 3; *(22)* Gurney, Diurn. B. of Prey 1884, 84; *(23)* Guillem., P. Z. S. 1885, 253; *(24)* Everett, J. Str. Branch R. A. S. 1889, 184; Tristr., Cat. Coll. B. 1889, 64; *(25)* Steere, List Coll. B. Philip. Is. 1890, 7; *(26)* Hartert, J. f. O. 1891, 299; *(27)* Salvad., Ann. Mus. Civ. Gen. 1891, 42; *(28)* Büttik., Zool. Ergebn. Webers Reise in Ost-Ind. 1893, III, 271;

(29) Sharpe, Ibis 1894, 244, 258; *(30)* Bourns & Worces., B. Menage Exp. 1894, 33; *(31)* M. & Wg., Abh. Mus. Dresd. 1896 Nr. 1, p. 7; *(32)* Hartert, Nov. Zool. 1896, 177.

b. **Elanus intermedius** *(1)* Schl., Mus. P.-B. Milvi 1862, 7; *(II)* id., Valkvog. Ned. Ind. 1866, 31, 68, pl. 24, f. 2, 3; Gray, HL. 1869, I, 28.

c. **Elanus melanopterus** *(1)* v. Martens (nec Leach), J. f. O. 1866, 9.

Figures and descriptions. Gould *1, II*; Schlegel *b II*; Sharpe *8*; Gurney *18*; Vorderman *21.*

Male adult. All under parts, forehead, sides of head and neck pure white; superciliary streak black; upper wing-coverts (except the longest) black; upper surface, including the two middle tail-feathers, ashy grey, darkest about the interscapulary region; end of quills dusky, below greyer and becoming pure white where the wing rests upon the sides of the body; the five outer pairs of tail-feathers white (S. Celebes, January: Meyer, Nr. 1680). "Feet citron-yellow; claws black; cere yellow; under the eyes yellowish; iris fiery red" (Meyer *14*).

Measurements. Wing 300 mm; tail 137; tarsus 38; bill from cere 19.5.

Female. An adult ♀ in the Sarasin Collection answers to the above description of the male: size — wing 310, tail 140, tarsus 39, bill from cere 20 mm (♀, coast between Macassar and Bonthain, 1. X. 95: P. & F. S.).

Young (assuming adult plumage). Above grey-brown, with white margins to the feathers, varied with new feathers of grey (maturity); wing-coverts black and under surface white as in the adult (♂, Lake Posso, Central Celebes, 19. II. 95: P. & F. Sarasin. Iris light yellowish brown (Everett).

Distribution. Celebes — Macassar (Wallace *4, 8*, Meyer *14*), Luwu, Gulf of Boni (Weber *28*), Lake Posso, Centr. Cel. (P. & F. Sarasin), North Celebes (Forsten *b 1*), Manado (Faber in Leyd. Mus.); Java (S. Müller *b 1*, Forbes *19, 20*, etc.); Sumatra (Beccari *15*, Modigliani *27*); Borneo (Schwaner *b 1*, Mottley *3*, Treacher *16*); Sooloo Islands (Burbidge *17, 23*, Everett *29*); Philippines — Luzon (Jagor *10*, Steere *25*), Cebu, Zamboanga, Basilan (Everett *11, 12, 13*), Mindoro, Negros, Guimaras (Steere *25, 26*), Calamianes (Bourns & Worcester *30*).

The adult specimen from Celebes described above does not show a trace of black upon the tips of the under primary coverts, apparent in Gould's figure *(II)* of the type from the same locality, but it is present to a slight extent in the Sarasins' adult example, while our four Javan specimens all show it more or less, as does also Schlegel's figure of one from this locality *(b II)*. Perhaps it is lost with age, as one of our Javan specimens has only a trace of it.

The Dresden Museum possesses one adult specimen and the Leyden Museum five from the West Coast of Sumatra, which have the terminal third of all the primary coverts and the under side of all the primaries (except a very small extent about the base of the shafts) black. These specimens differ from *E. axillaris* (Lath.) of Australia in having the two central tail-feathers, not uniform dirty white like the other tail-feathers, but of the dark colour of the upper surface, which is also altogether of a darker grey than in the Australian form.

From *E. coeruleus* they are distinguishable by the presence of this black on the under primary coverts and by the black under surface of the primaries. From *E. hypoleucus* they differ in the same respects, but the constrast of colour

of the under surface of the primaries is, of course, greater than is seen when the specimens are compared with *E. coeruleus*. Count Salvadori identifies his Sumatran specimens with *E. hypoleucus (15, 27)*; it is impossible to do this with these birds (Nr. 6740, Dresd. Mus.) which we propose to call provisionally *E. coeruleus—axillaris*, an intermediate form.

As specimens of *E. axillaris* have been reported from Java (Gould *II* and Gurney *18*), these perhaps belong to the same intermediate form, which may in fact link together *E. coeruleus* of Europe — India and *E. axillaris* of Australia.

Among the 17 examples in the Leyden Museum there is one from Java which has the wings nearly as black below as the Sumatran birds (♂; Voy. Diard, Cat. Nr. 6); two others from Java and one from Manado (Faber) have the primaries below blackish with the basal part white; another from Banjermassing, Borneo, is a true *hypoleucus*. These form, in fact, transitions between the Sumatran birds and six others from Java and Celebes, which have the under wing-coverts and under surface of quills nearly all white and are the true *hypoleucus*.

It thus appears probable enough that we have not to do with several species, but with a set of subspecies of one form, and that *E. hypoleucus* is very closely related to, and probably only subspecifically distinct from, *E. coeruleus* (Desf.) known from S. E. Europe, Africa, India to the Malay Peninsula (Hume, Str. F. VIII, 45).

The form *hypoleucus* is a rare, or very local, bird in Celebes, as also, apparently in Borneo: no specimens have been included in the large collections made of late years in North Celebes, from which locality the single specimen of Forsten in the Leyden Museum and that more recently obtained by Faber appear to be the only ones on record; nor was it represented in the collection formed by Dr. Platen near Macassar in 1878.

Its food consists largely of lizards, though doubtless, like *E. coeruleus* in Ceylon, it devours coleoptera and rats and mice as well (Legge, B. Ceylon, 87). In India the latter species, like *E. axillaris* Lath. of Australia, lays three or four eggs; but, considering its rarity in Celebes, it is probable that *E. hypoleucus* breeds more slowly than these, if it is stationary there.

Gould *(II)* remarks that there is not a more distinct and better defined group of Hawks than those forming the genus *Elanus*, which occurs both in the Old and New Worlds. Its occurrence in two species in Australia, and its absence, so far as is known, in Papuasia and the Moluccas is worthy of note.

GENUS PERNIS Cuv.

The Honey-buzzards are of medium size and easily recognised by their feathered lores; the bill is weak, tapering, not strongly hooked, the culmen rounded, tomia not festooned, the cere very large, occupying two-fifths of the exposed culmen, the nostrils oblique, covered posteriorly by an operculum of

the cere-skin; wings and tail long, the tail slightly rounded; tarsus short, reticulate, the upper half feathered in front; toes rather long. Feeds chiefly on the larvae of *Hymenoptera*. 3 or 4 species, migratory and stationary, found in Europe, Africa and Asia as far as Celebes. Eggs 1—2.

+ * 22. PERNIS CELEBENSIS (Wall.).

Celebesian Honey-buzzard.

Plates II and III.

a. **Pernis cristatus** part. *(1)* Schl., Valkv. Ned. Ind. 1866, 39, 73, pl. 26, f. 4; Gray, HL. 1869, I, 26; *(2)* Schl., Rev. Acc. 1873, 132, Nr. 16 only.

b. **Pernis cristatus** var. **celebensis** *(1)* Wall., Ibis 1868, 17.

c. **Pernis ptilorhyncha** *(1)* Wald. (nec Temm.), Tr. Z. S. 1872, VIII, 36.

Pernis celebensis *(1)* Wald., t. c. p. 111; *(2)* Sharpe, Cat. B. 1874, I, 349; *(3)* Tweedd., Ibis 1877, 287; *(4)* Meyer, Ibis 1879, 56; *(5)* Gurney, Ibis 1880, 216; *(6)* Hume, Str. F. IX, 1880, 448; *(7)* Gurney, t. c. 1881, 448; *(8)* W. Blas., J. f. O. 1883, 114, 126, 135; *(9)* Gurney, Diurn. B. of Prey 1884, 87; *(10)* Guillem., P. Z. S. 1885, 545; *(11)* Newton, Dict. B. 1893, 427; *(12)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 4; *(13)* iid., ib. 1896 Nr. 2, p. 7.

d. **Baza celebensis** Rosenb. (nec Schl.), Malay. Archip. 1878, 271.

"Goheba" v. Schierbrand in Mus. Dresd.

"Koheba", Manado, Guillem. *10.*

Figures and descriptions. Schlegel *a I, a 2*; Walden *1, 3*; Sharpe *2*; Gurney *5, 7, 10.*

Adult. Above Prout's brown with a purplish gloss; head above black; feathers of the neck broadly margined with rufous; tail whity brown crossed with about five bands of black and mottled in the interspaces with wavy lines of brown, a space of about 57 mm separating the terminal and subterminal bands; extreme end of tail whitish; lores and region around the eye smoke-brown; chin and throat white, marked with black streaks gathered into black stripes down the middle and at the sides of the throat; breast light russet striped with black; remaining under parts, including under wing-coverts and thighs, white closely barred with sepia-brown; under side of quills whitish with about seven bars of sepia-brown, broken up at the base. "Iris light yellowish brown ("dark brown" — M.); length in the flesh 620 mm" (Ribbe and Kühn, Maros, S. Celebes, Nr. 3920). Another specimen (Nr. 5756 Manado) closely resembles that described.

Young (first plumage). Back, wings and upper tail-coverts sepia, varied with drab-brown and white on the greater wing-coverts and scapulars; some feathers of dark Prout's brown present in the interscapulary region; tail much as in the adult; head and neck white, the latter streaked with Prout's brown, many feathers of the same colour sprouting on the occiput; in front of eyes smoky grey; under parts white, uniform on chin, throat, abdomen and under tail-coverts, narrowly streaked with dark brown on the breast, barred with paler brown on the thighs, barred with rufous on the axillaries, and very faintly with pale rufous on the anal region and under tail-coverts. At the flanks the specimen has obtained some of the feathers of maturity barred with dark brown and white. (N. Celebes Nr. 14011).

Two other young specimens in the Leyden Museum, apparently rather older than that described above, have the head clothed with feathers with white bases, and

black centres passing into light brown at the margins, giving a streaked appearance; feathers about eye brownish slaty; the rest much as in the above, but the white under surface more abundantly streaked with brown (N. Celebes — Faber in Leyd. Mus. Nr. 45, 35).

Another specimen, a little older, has the thighs, belly, axillaries and under tail-coverts well barred with brown; under wing-coverts with sagittate spots of brown showing a tendency to form into bars; breast buffy white, streaked with sepia-brown (Minahassa, v. Musschenbr. in Leyd. Mus.).

The specimen in the Leyden Museum figured by Schlegel *(a I)* is not quite adult, though more advanced than the immature bird described by Gurney *(6)*; under wing-coverts white, touched up with a few small streaks of dark sepia or little bars of faint brownish or rufous; the bars — especially the white ones — on belly, flanks and under tail-coverts much broader than in adult (♀, Bone, Rosenb. in Leyd. Mus.).

Measurements.	Wing	Tail	Tarsus	Mid. toe with claw	Culmen from cere
a. (3920) ad. S. Celebes (Ribbe & Kühn) . . .	370	270	48	—	—
b. (5756) ad. Manado, N. Cel.	370	250	46	—	22
c. (C 14500) ad. Peling Id. V—VIII. 95 (Nat. Coll.)	370	245	50	70	25
d. (Sarasin Coll.) ♀ ad. Kema, N. Cel. 5. X. 93	375	260	—	—	25
e. (14011) juv. N. Celebes	350	247	50	—	—

Distribution. Celebes, Peling. — Bone in Gorontalo (v. Rosenberg *a 2*), Minahassa (Meyer *1*, *4*, Guillemard *10*; etc.), S. Peninsula, Maros (Ribbe & Kühn); Peling Id. (Nat. Coll.).

This rare Honey-buzzard was known until recently only from the northern Peninsula of Celebes, but, as is shown above, there is one in the Dresden Museum from South Celebes and one from Peling Island. There is a fine series of eleven in the Leyden Museum.

The similarity of the adult plumage of this Honey-buzzard to that of the adult Celebesian Hawk-eagle, *Spizaetus lanceolatus*, was noticed by Schlegel when figuring the species *(a I)*, and has since been commented upon by other writers. The resemblance in coloration may, indeed, be spoken of as perfect (see our plate), as remarkable as that of *Xenopirostris polleni* and *Tylas edwardsi* in Madagascar, where the plumage of one bird is, as Prof. Newton says, counterfeited in the other, "feather for feather" (Dict. B. p. 574). Gurney, who knew more about birds of prey than anybody, termed the case of the Celebesian *Pernis* and *Spizaetus* as extraordinary. The young in first plumage of the Honey-buzzard, now described and figured for the first time, is entirely different in coloration from its parents, but just like the Hawk-eagle at the same age! Mr. Wallace has cited a corresponding case seen in two American Hawks, a Sparrow-hawk and an insect-eating *Harpagus* (Contrib. Nat. Select. 107; and Newton, Dict. B. 574) — young like young, and adult like adult. On an earlier page of this book (p. 26), we have drawn attention to another case of exactly the same nature — that of the Hawks *Spilospizias trinotatus* and

Accipiter rhodogaster. The similarity of the adult Honey-buzzard and Hawk-eagle of Celebes naturally did not escape Mr. Wallace, and he remarks *(b 1)* that it must be ascribed to the influence of some local peculiarity or to mimicry; the same explanation of mimicry is advanced by him for the American *Harpagus* and *Accipiter*.

As to the Honey-buzzard and Hawk-eagle, the first suggestion — that of some local peculiarity — seems to us to be insufficient of itself alone to account for the production of a striking correspondence in the characteristic markings of two birds of different habits of life; though soil, climate, food, and the coloration of surrounding objects are doubtless not without effect upon the coloration of a bird's plumage.

Touching the argument for mimicry it is possible to urge that either species may be benefited by resembling the other: (a) that the weaker Honey-buzzard, through assuming the dress of the Hawk-eagle, would be avoided by any competitors for the same class of food, suffer less from the persecution of Crows and other birds, and so enjoy a freer field of action when searching for its food and attending to its nest; (b) that the Hawk-eagle, from its likeness to the harmless, insect-eating Honey-buzzard, would be at an advantage in approaching the Rails, Waterfowl and other large birds and small mammals upon which it preys.

Apart from anything else, it must be objected to the first argument that the Honey-buzzard apparently stands alone among the higher animals as a devourer of wasps' nests and their contents, and other destroyers of wasps' grubs are only to be found among small insects (such as *Stylops*, which deposits its eggs in the bodies of *Hymenoptera*), which — it need not be said — could not be afraid of it in the dress of a Hawk-eagle; also, birds of prey are hated and persecuted by other birds just on account. of their predatory habits, and it might be well for *Pernis celebensis* in this respect if it resembled some more harmless bird. As it is, there is reason to suppose that the Honey-buzzard is not much molested; in his "Birds of Ceylon" p. 92, Colonel Legge mentions a specimen of the allied *Pernis ptilonorhynchus* which was shot in the fort at Trincomalie while "associating with Crows, and flying round the barrack-room at the dinner hour in company with them, on the look-out for scraps thrown out from the verandahs". The European Honey-buzzard, however, according to Naumann and Dresser, is much given to robbing the nests of other birds, and is vigorously mobbed in consequence.

The second argument which we have set up — that the Hawk-eagle in the disguise of the *Pernis* would be at an advantage in approaching its prey — is stronger; but there are reasons which go far to destroy it. In order that the animals upon which it preys should be rendered indifferent to the appearance of the *Spizaetus*, it is necessary that the harmless *Pernis* should be a very familiar bird and the Hawk-eagle rare. This is not the case. In four of the

largest collections of Celebesian birds of prey — the Leyden[1]), British, and Norwich Museums, and the Duivenbode-collection reported upon by Prof. W. Blasius — *Pernis celebensis* numbered in all 11 skins, *Sp. lanceolatus* 22. There are before us in Dresden 5 of the former and 7 of the latter.

Supposing — which is probably not the case, since birds are better field-ornithologists than most naturalists — that the birds etc., which suffer from the frequent depredations of the Hawk-eagle, do not at once discriminate its differences from the Honey-buzzard, they will avoid both species with dread; but it is more likely that the differences of size, structure, flight and general bearing cause the dangerous species to be detected, possibly even before its peculiar coloration is made out.

Moreover, in the Philipines, as will be noticed presently, a *Spizaetus*, *S. philippensis*, has been found closely resembling the Celebesian species, though the bird is unsatisfactorily known, but in these islands *Pernis celebensis* is represented by the highly variable *P. ptilonorhynchus*. Also in Malacca and Sumatra a *Pernis* has been described as showing much similarity to *P. celebensis*, but in these quarters the Hawk-eagle is *S. limnaetus*, which seems to be a very variable species and can by no means be said to match the Honey-buzzard, except that, perhaps, the latter possesses the same quality of great variability in common with it.

Furthermore, a type of plumage, bearing much resemblance to that of the adult *Pernis* and *Spizaetus* of Celebes, is seen in a South American Buzzard, *Buteo melanoleucus* Vieill. *Spizaetus mauduyti* of South America also bears some resemblance to the *Pernis* and *Spizaetus* of Celebes.

If we were to seek for cases of close resemblance among birds of different genera not occurring in the same locality, we are confident that many might be found. To mention two: *Spilornis holospilus* of the Philippines is very like *Circus assimilis* J. & S. of Celebes and Australia in its coloration, and *Ninox punctulata* of Celebes to *Glaucidium jardini* Bp. of S. America. Here the theory of mimicry is, of course, worthless. Touching the albescent plumage of the young, so completely different from the adult dress, those who maintain the theory of mimicry might perhaps here advance the suggestion that the causes, whatever they may be, by which one species is advantaged by resembling the other were the same in past ages as today; consequently, when the one was albescent, the other must needs become albescent too, and when the first assumed its present adult plumage, the other must needs follow it in this variation; while phylogenetic reasons here as elsewhere come in to account for the repetition in immature birds of what had been gone through by their ancestors.

As containing an alternative explanation to that of Mr. Wallace, the phylogenetic relationship of the two forms, *Pernis celebensis* and *Spizaetus lanceo-*

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1) Since the publication of Schlegel's "Revue", the number of specimens of *P. celebensis* has been increased to 11.

latus should be considered. That the plumage of birds sometimes betrays their descent is about as certain as any thing zoological can be. For instance, the Kingfishers of the genus *Pelargopsis* have blue rumps, but the Celebesian species has the rump buff; we have received the latter (one specimen) when not yet adult, and the rump is strongly washed with blue. The greatest caution is, however, required in applying this line of argument, for the plumage of the young seems also to be affected by all sorts of other causes not at all well understood. There is reason to suppose that the plumage displayed by the young of *Pernis celebensis* and *Sp. lanceolatus* — a white under surface with dark streaks — not only represents that of an ancestral stock common to both these forms, but also more or less accurately that of a vast number of other birds of prey. Almost all *Falconidae*, which acquire a transverse-barred pattern of under plumage when adult (*Astur*, *Accipiter*, *Falco peregrinus* etc.), are in the first dress, assumed on leaving the nest, brown above and white with dark longitudinal streaks below. The opposite case — of a cross-barred young one developing into a streaked adult bird — would, we believe, be an unheard-of phenomenon, though a temporary reversion of the kind sometimes apparently takes place, in *Spilornis* (see p. 3); as a rule striped birds of prey, like the Falcons, have young much resembling the females. If these facts have any meaning at all, they must signify that all these birds are descended from streaked races of Hawks of past ages, similar in coloration, perhaps, to the Buzzards and Falcons of the present day. Consequently there is, at all events, no reason to suppose that the *Pernes* and *Spizaeti* have been developed from a more remote stock of *Falconidae* than that which is now represented by their first plumage.

We take it that the young plumage, shown on our plate, is very ancient in type, though how closely similar it may be to the plumage of the ancestor of *Pernis* and *Spizaetus*, or how much changed by later influences, we have no opinion. From this common ancestor the present full dress of the *Pernis* and *Spizaetus* of Celebes may have been evolved under one of three conditions: 1. the structural differences were first developed and then the evolution of the plumage proceeded similarly in both and the birds grew alike, or 2. the evolution of the plumage proceeded on similar lines while the structural changes were going on; or 3. the present adult plumage is ancient and had been acquired before the structural differentiation commenced.

It is difficult to form an opinion as to which of these three explanations is the more probable; the first may be true or false; there seem to be no methods for testing it, proving, or disproving it. If we look at Plate III of the young of today, and imagine we are viewing the birds as they were when adult at some period of the past, after the structural change had taken place, we may well wonder why these two birds, structurally so different, should undergo a great but identical change of coloration. We cannot imagine that two birds may have undergone such a structural change and have assumed such different

habits while the causes of the evolution of the coloration have undergone no change. One feels compelled to seek some natural selective agent to explain why the coloration did not develop in very different directions in the two birds, instead of in an identical direction.

The second hypothesis — that the change of structure and the evolution of the coloration proceeded quietly together through perhaps a long period of time, — is more acceptable because it makes a less abrupt and violent appeal to the imagination, but there seems to be nothing further in its favour.

The third hypothesis — that the present adult dress had been acquired before ever the structural differentiation into *Pernis* and *Spizaetus* (not to speak of other genera) had taken place — admits of discussion from several points of view.

It is certain (A) that small structural changes may take place without causing any marked changes of the adult coloration: witness many of the Kingfishers, where the type of coloration of the four-toed *Alcedo* may be found in certain species of the three-toed *Ceyx* (the more recent form in respect of the foot) and others, or certain Flycatchers like *Siphia*, *Muscicapula* (pls. XIII—XIV) and others, with one or two types of coloration running through closely-allied genera, or the Flowerpeckers *Acmonorhynchus* and *Pachyglossa*, much alike in coloration, but the former (the more recent form in respect of the wing) has nine primaries, the latter the customary ten.

(B) The hypothesis involves the assumption that the land of origin of the genera *Pernis* and *Spizaetus* was ancient Celebes. There is, we believe, a form of prejudice, against which we ourselves have to struggle, which pre-supposes that ancient Celebes (whatever sort of island, or islands, or adjunct of Asia it may have been) has simply been a receiver of birds from other parts, a land for colonisation, which has kept to itself the bird-forms it received. In the main this view is very likely right, but it is probable that in some cases Celebes may have sent out bird-colonists of its own.

The genus *Pernis* is a link between Celebes and Asia, not being found in the Australian Region; only one aberrant *Spizaetus*, *S. gurneyi*, is found east of Celebes, and the two genera may, of course, have become differentiated structurally from one another in Celebes as well as anywhere else. There is something to be said for this view. In the Great Sunda Islands and the Philippines as far as India, both the Honey-buzzard *(Pernis ptilonorhynchus)* and the Hawk-eagle *(Sp. limnaetus)*, instead of possessing — as seems to be the case in Celebes — a fixed adult dress, agree in being wonderfully variable. Now, it appears that long ages in a given locality, with the same climate, food, dangers, predilections and regular routine of habits, and, perhaps, other more hidden influences, lead to the assumption of a more or less fixed, stable coloration in birds, as is shown by the species of all tropical islands sufficiently remote from one

another[1]); but, when some of these species by reason of overcrowding, a storm, or other cause, are transported to a fresh locality where the conditions of existence are changed, the original, fixed coloration becomes disturbed — if there was originally a useful purpose in it, that purpose is now removed, — variability has free play for the time, and the amount of variation is made greater and more complicated by the interbreeding of the changing individuals. On these grounds the Celebesian Hawk-eagle and Honey-buzzard should be regarded as ancient forms, the variable birds of Borneo, etc. which have not yet settled down into a fixed type of plumage of their own, as of more recent origin. Leaving out of the discussion *Pernis tweeddalei* of Malacca which is only known in three or four specimens, the only remaining species of *Pernis* is our own *Pernis apivorus* — very variable and therefore, also recent. *Spizaetus*, however, has developed into a number of local species elsewhere than Celebes viz. the Indian Region, Africa, S. America. Let it be remembered, that Celebes, as is shown by some of its mammals as well as by some of its birds, is an ancient land, zoologically speaking, and that neither *Pernis* nor *Spizaetus* (except in the aberrant *S. gurneyi*) pass into the still more ancient Australian Region, and it will be seen that *P. celebensis* and *S. lanceolatus* have some claim to be regarded as the most ancient members of their genera.

(C) One of the most convincing arguments made use of by Charles Darwin in tracing the descent of domestic Pigeons from the Blue Rock Pigeon *(Columba livia)* was drawn from the occasional reversion, partial or nearly complete, of the former to the plumage of the Blue Rock. If the variable *Spizaetus limnaetus* and *Pernis ptilonorhynchus* are descended from specimens of *S. lanceolatus* and *P. celebensis* which have flown across from Celebes to Borneo, or the Philippines and further, similar cases of reversion should be found. Now, in his Valkvogels Ned. Ind. Schlegel portrays nine specimens of the variable *Spizaetus limnaetus* (called by him *S. cirratus*) and six of *Pernis ptilonorhynchus* (here called *cristatus*: pls. VI-VIII and XXV, XXVI), and among them some fairly good matches to the two forms of Celebes may be seen. About four specimens of a Honey-buzzard called *Pernis tweeddalei*, Hume, have been described from Malacca and Sumatra; it bears much resemblance to *Pernis celebensis*, and it seems very doubtful if they are more than individual variations of the variable *P. ptilonorhynchus*, since that bird lives not only on both sides of, but also in the same localities as the supposed distinct form (cf. Hume *6*, and Str. F. 1887, X pl., p. 513; Schlegel *a I*, and Mus. P.-B. Pernes 1862, 2; Schl. & S. Müll., Verh. Natuurk. Comm. 1839—44, 49, pl.; Kelham, Ibis 1881, 369; Gurney *5*, *7*). The little known *Spizaetus philippensis*, which seems to be much like the Celebesian Hawk-eagle (see Walden, Tr. Z. S. 1875, IX, pl. XXIV), is not unlikely to prove

[1]) As an exception the extinct Solitaire *(Pezophaps)* of Rodriguez must be mentioned (see: Newton, Dict. B. "Solitaire"). This large bird was most variable in structure and colour. It used evidently to get much knocked about in fighting. The male Ruff, another great fighter, is probable the most variable bird known. See remarks in Introduction on inherited mutilations of feathers, etc.

to be an individual variety of the variable *S. limnaetus*; Prof. W. Blasius finds that bird in Mindanao (J. f. O. 1890, 144). It is possible that all these forms are reversions to the two original forms of Celebes.

To these reasons may be added, (D) that both *Pernes* and *Spizaeti* lay only one or two eggs at a sitting and, thus, they are not likely to get crowded out of a large island, but might exist there with the conditions of reproduction and destruction at a balance for any required length of time.

In how far these remarks are well, or ill, grounded can, of course, only be ascertained by a much more thorough knowledge and study of the two genera, *Pernis* and *Spizaetus*, than has been possible to us; but the case serves to show — and we believe it is only one in very many — that, where some striking similarity between two members of distinct genera occurs, this may be looked upon as an ancestral character retained, rather than as something acquired by the natural selection of varieties of one species, which obtained some advantage by resembling the other. Whoever has examined young and old specimens of these birds will find it hard to listen to the supposition, that the parallelism between the two forms is a fortuitous coincidence, that they are of independent development, but in our present state of ignorance any one who will is perfectly free to make this suggestion and hold to it.

The label on a specimen in the Dresden Museum, stating that the stomach contained wasps and their larvae, shows that *P. celebensis*, like the other species of the genus, feeds mainly upon hymenoptera, its peculiarly feathered face protecting it against their stings. The allied *P. ptilonorhynchus* is found as a rule to lay two eggs, but one egg at a sitting is not uncommon (Oates, Hume's Nests and Eggs, 1890, III, 181).

23. PERNIS SP.

In the Novitates Zoologicae 1896, 177, Mr. Hartert describes a Honey-buzzard obtained by Mr. Everett in Saleyer in November, 1895, but which he was unable to identify with certainty. "A large bird (female), remiges moulting, wing 440 mm. The whole underside is buff or ochraceous buff, some of the feathers (older ones) paler, others (the new ones) darker and brighter. The throat is surrounded by an irregular black band, the feathers of the lower throat and upper breast have narrow deep brown shaft-lines, but all the breast, abdomen, flanks, scapulars [axillaries?] and under wing-coverts are uniform without a trace of bars or bands. Upper side dark brown as in most *Pernes*, not differing from many specimens of *P. ptilonorhynchus*."

Mr. Hartert believes the specimen to belong to the latter species, and not to *P. celebensis*. It is manifestly immature, but from the description evidently differs from the young *P. celebensis* by its larger size, and the absence of bars on the flanks, thighs and under tail-coverts. *P. ptilonorhynchus* (Temm.) is a highly variable species, as is pointed out in the preceding article, but it may always be distinguished from *P. celebensis* by its large size, and the adult — usually at all events — has a long nuchal crest.

GENUS BAZA Hdgs.

Birds of small-medium size, with a nuchal crest, long and nearly square tail, and moderately long wings; especially characterized by the edge of the upper mandible which is furnished with two sharp points or teeth[1]); tarsus short, upper half feathered in front, the rest covered with polygonal scales, much larger in front than behind. Feeds on insects. Lays 3 eggs. About 11 species of a local character, found from India to Australia, and in parts of Africa.

* 24. BAZA CELEBENSIS Schl.

Celebesian Baza.

a. **Falco (Lophotes) reinwardti**, partim, *(1)* S. Müll. & Schl., Verh. Nat. Comm. 1839—44, 37, 38 (young ♀ only, from Tondano, N. Celebes: Forsten — fide Schl.).

b. **Baza reinwardtii**, partim, *(1)* Schl., Mus. P.-B. Pernes 1862, 5, Nr. 5 only.

c. **Baza magnirostris** *(1)* Wall. (nec Gray), P. Z. S. 1862, 337; *(II)* Schl., Valkv. 1866, 40, 75, pl. 28, f. 4 only (Celebes, Sula); *(3)* Wall., Ibis 1868, 18; *(4)* Wald., Tr. Z. S. 1872, VIII, 36, pt. (Celebes, Sula); *(5)* Meyer, Ibis 1879, 56.

d. **Baza reinwardti** Finsch (nec M. & S.), New Guinea 1865, 154 (Celebes).

Baza celebensis *(1)* Schl., Rev. Acc. 1873, 135; *(2)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 1, p. 7; *(3)* iid., ib. Nr. 2, p. 7; *(4)* Hartert, Nov. Zool. 1896, 162.

e. **Baza erythrothorax** *(1)* Sharpe, P. Z. S. 1873, 625; *(II)* id., Cat. B. 1874, I, 357, pl. X, f. 2; *(3)* Brüggem., Abh. Ver. Bremen 1876, 46; *(4)* Gurney, Ibis 1880, 462, 469; *(5)* W. Blas., J. f. O. 1883, 114, 135; *(6)* Gurney, Diurn. B. of Prey 1884, 90.

Figures and descriptions. Schlegel *c II, 1*; Sharpe *e 1*, *e II*; Brüggemann *e 3*; Gurney *e 4*.

Adult male. Above dark brown, blackish on mantle and carpal region; head and crest black; face and ear-coverts dark grey; tail brown, crossed with three bands of darker brown — the endmost one much the broadest — and broadly tipped with white; throat and chest russet-brown; a black streak down the middle of the throat; rest of under surface broadly banded with darker brown and white, the markings more rufous on thighs and under wing-coverts; under tail-coverts whitish, blotched with rufous (♂, Enrekang, S. W. Central Celebes, 7. VIII. 95, P. & F. Sarasin.

Female. Differs from the adult male in having the feathers of the head and neck black broadly margined with rufous, crest tipped with rufous; face and ear-coverts rufous like throat and breast (not dark grey); the bands on the under parts rufous like the breast, only a little browner on flanks; upper parts glossy brown, not so black as in the male (♀, Enrekang, 7. VIII. 95, P. & F. S.).

We at first took this specimen and a similar one before us for the young, but the presence of some old worn feathers in the wings shows that it is at least in its second year.

"Bill lead-colour, black above; feet white; iris yellow" (Wallace).

Young. Like the female, but the banding on the under surface ill-defined.

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[1]) "In the young bird, the tooth is often single" (Blanford).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (C 10479) [♀], Celebes	295	195	35	22.5
b. (Sarasin Coll.) ♀, S. E. Central Celebes, 7. VIII. 95	323	202	37	24
c. (Sarasin Coll.) ♂, S. E. Central Celebes, 7. VIII. 95	300	190	37	24.5
d. (C 14625) ad. [♂], Banggai Id., V.-VIII. 95 (Nat. Coll.)	290	187	36	26

The specimen from Banggai is like the adult male from S. E. Central Celebes in the Sarasin Collection. As a rule the species of Sula do not differ from those of Banggai and Peling. It is possible, however, that when more specimens from Sula are to hand they will be found to present some points of difference, as is suggested by the two examples in the Leyden Museum.

The following notes were made there:

a. ♂, Sula Besi (Bernstein),
b. ♂, Sula Mangoli (Bernstein).

Similar examples with grey cheeks and ear-coverts, dark slaty head with black crest; throat-streak black, more developed in one (that figured by Schlegel, Valkv. pl. 28, fig. 4) than in the other; chest uniform light chestnut-rufous; rest of under surface banded with the same colour (somewhat browner at sides) and white:

c. ♀ [?], North Celebes (Forsten),
d. ♂, Manado (v. Duivenb.),
e. —, Manado (v. Musschenbr.).

Three similar examples, corresponding with *a* and *b* in having grey cheeks and ear-coverts and dark slaty head with black crest; but the bars on the under surface are not of the same tint as the chest, being browner (hair-brown). Probably the adult plumage, but in one the first primary on each side is not fully grown:

f. —, Manado (v. Musschenbr.),
g. —, Minahassa (v. Musschenbr.).

Two immature (or female) specimens, with cheeks and ear-coverts rufous (or rufous brown); crown of head rufous with black centres and tips to the feathers; crest black; breast rufous; under surface banded with the same colour, one specimen agreeing in this respect with the Sula birds, though those appear to be adult; in the other specimen (probably the younger) the rufous colour predominates on the under surface, the white cross-bands being very ill-determined.

Adult males from Sula may, therefore, prove to differ from adult males from the Minahassa by having the under surface banded with rufous like the chest, instead of with hair-brown.

Distribution. Celebes to Sula. — Minahassa (Forsten *a 1*, *b 1*, *1*, v. Duivenbode *1*, Meyer *c 5*, etc.); S. E. Central Celebes (P. & F. Sarasin *2*); South Peninsula (Wallace *c II*); Banggai Island (Nat. Coll.); Sula Besi and Sula Mangoli (Allen *c 1*, Bernstein *1*, Hoedt *1*).

Under the original description of *Baza reinwardti (a 1)* there were included a female specimen obtained near Lake Tondano, North Celebes, by Forsten, a female from Pontianak, Borneo, and three males — at first erroneously stated to have come from Manado, but which were afterwards found to have been obtained in Amboina and Ternate (Schl., Rev. Acc. 1873, 133, Nos. 1, 2 and 42). These last three specimens belong to a very distinct species and should be

recognised as the true *Baza reinwardti* as is done by modern authors, since the plate given (under *a 1)* represents two of them and the first of the descriptions is made from one of them. The two specimens from Celebes and Borneo were then identified by Schlegel and others with the closely allied *B. magnirostris* Gray of the Philippines[1]) *(c II)*; finally the Celebes and Sula Islands' form was marked off as a distinct species and named almost simultaneously *B. celebensis* by Schlegel and *B. erythrothorax* by Sharpe (6, 7). The description of Schlegel was published in July, 1873; that of Dr. Sharpe received at a meeting of the Zoological Society of London in June of the same year; but, as such papers are not published in the Proceedings till October, the priority rests with Schlegel. In the Catalogue of the Birds of Prey in the British Museum, 1874, the specimen from Borneo was overlooked except that Schlegel's figure of it was included in the synonymy of the Celebesian species. For a long time it remained the only example on record from Borneo. It was identified by Salvadori (Cat. Ucc. Borneo 1874, 11) with *Baza jerdoni* Blyth of Malacca, but was named as distinct *B. borneensis* by Brüggemann *(e 3)*. Ultimately Dr. Sharpe received 3 specimens from the Baram District of Borneo shot by Mr. Hose, and the distinctness of the Bornean birds as a species is upheld by him, though their identity with the Sumatran form is regarded as possible (Ibis 1893, 554—557). The Sumatran bird, according to Sharpe, is the same as *B. jerdoni* of Malacca and *B. incognita* Hume of Tenasserim and Native Sikkim. Mr. Blanford (Faun. Br. Ind. B. 1895 III, 411), who remarks that only one specimen is known from Tenasserim and one from Sikkim, agrees with Dr. Sharpe in uniting the birds from Sikkim to Sumatra as one species.

The Celebesian *Baza* is interesting as a link between Celebes and Sula, it is also of interest from its being very closely allied to the Philippine, Bornean and Sumatran species[2]), but not so with *B. reinwardti* of the Moluccas and Papuasia from Buru to New Guinea. It is a rather rare bird in collections; probably, like its congeners, it inhabits thick forest and preys entirely upon insects, as Davison observed to be the case with *Baza lophotes* (Str. F. VI, 1878, 24). Of the breeding of the *Bazae* next to nothing is known. In Australia Mr. Ramsay procured a nest of *B. subcristatus* containing three eggs, and others have been obtained there also. Quite recently Mr. Blanford has described the nest and 3 eggs of *B. lophotes* from Tenasserim (B. Br. Ind. 1895 III, 410; North, Nests and Eggs B. Austr. 1889, 15).

25. BAZA REINWARDTI Müll. Schl.

Reinwardt's Baza.

a. **Falco (Lophotes) Reinwardtii,** part. *(I)* S. Müll. & Schl., Verh. Natuurk Comm. 1839—44, Aves, 35, pl. 5, fig. 2.

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[1]) The type is labelled "June, Island of Manilla, South" by Cuming (Sharpe, Ibis 1893, 555).

[2]) The genus has not yet been discovered in Java.

Baza reinwardti *(1)* Schl., Mus. P.-B. Pernes 1862, 5, Nrs. 1, 2, 4, 7; *(II)* id., Valkvogels Ned. Ind. 1866, 40, 77, pl. 27, figs. 1—3; *(3)* id., Rev. Accip. 1873, 133, pt., *(4)* Sharpe, Cat. B. I, 1874, 358; *(5)* Salvad., Orn. Pap. I, 1880, 26, 549; *(6)* W. Blas., J. f. O. 1883, 115, 124, 131; *(7)* Salvad., Orn. Pap. Agg. 1889, 12; *(8)* Gurney, Ibis 1893, 339; *(9)* Meyer, Abh. Mus. Dresd. 1893, Nr. 3, pp. 4, 5; *(10)* Hartert, Nov. Zool. 1896, 177, 247, 598; *(11)* Salvad., Ann. Mus. Civ. Gen. 1896, XXXVI, 59.

b. **Baza stenozona** *(1)* Gray, P. Z. S. 1859, 169, 189.

For further synonymy and references cf. Salvadori 5, 7, 11.

Figures and descriptions. Müller & Schlegel *a I*, Schlegel *II*; Sharpe *4*; Salvadori *5*.

Adult. Above slate-grey, carpal region, upper tail-coverts, and a short crest blacker, secondaries with a subterminal band of blackish, primaries crossed with 4 or 5 bands, basally obliterated; scapulars and innermost remiges brown; terminal third of tail black, basal part slate-grey, crossed with three nearly obliterated black bars; face, throat, and chest grey, paler than on head; remaining under parts white, passing into rufous cinnamon on middle of abdomen, thighs, and under tail-coverts barred with brownish grey on breast, sides and abdomen; under wing-coverts whitish, rufous cinnamon about the middle (ad. Ceram: Dr. Riedel — Nr. 6743).

"Iris yellow; cere, mandible, basal half of maxilla light plumbeous; apical half of maxilla jet-black; feet white, claws brown" (Everett *10*).

Young (just about able to fly). Similar to the adult, but the throat white, with black shaft-lines; breast cinnamon, the middle portion of the feathers grey; the bars on the under parts brown and somewhat narrower; the feathers of the upper parts browner with pale edgings; tail broadly tipped with grey. The crest is already present (juv. Amboina: Dr. Riedel — Nr. 6745).

Immature (apparently assuming adult plumage). Browner above than the adult described from Ceram; throat whitish, chest greyer, under parts stained with rufous cinnamon and barred on breast, sides, abdomen, and axillaries with rufous brown (not dark brownish grey); the terminal black band on the tail only one-fifth of the entire length (Bonerate, 1895: P. & F. Sarasin.

Measurements.

	Wing	Tail	Tarsus	Bill from cere
a. (Sarasin Coll.) vix ad. Bonerate	320	203	37	22
b. (6743) ad. Ceram (Riedel)	287	168	34	21
c. (6744) ♀ ad. Buru (Riedel)	318	175	—	20
d. (2963) ad. Andei, N. Guinea (Meyer)	292	180	—	—
e. (2964) juv. Andei, N. Guinea (Meyer)	300	175	—	—
f. (5800) ad. loc. incert. (v. Schierbr.)	316	180	—	21
g. (5801) juv. loc. incert. (v. Schierbr.)	270	170	—	20

Distribution. Moluccas — Amboina, Ceram, Buru (cf. Salvad. *5*), Papuasia — Waigiou, Salawatti, Mysol, Misori, New Guinea, Kei, Aru (cf. Salvad. *5*, *7*), Timor (Wallace, v. Rosenb. *5*), Lombok (Everett *10*), Djampea Id. (Everett *10*), Bonerate Id. (P. & F. Sarasin).

Reinwardt's Baza has to be included in the Celebesian list in virtue of two specimens from Djampea and Bonerate between Celebes and Flores, the first collected by Mr. Everett, the other presented to the Messrs. Sarasin when in Celebes. The latter specimen is remarkable for the length of its tail and the narrowness of the black terminal portion, and for the rufous brown bars of

the under surface. It is not fully adult. It differs from *Baza rufa* by the colour of the chest — all grey. By its head, throat, and chest it resembles *B. timorlaoensis* Meyer, but the banding below is different. Mr. Hartert has most kindly sent us particulars about the Djampea specimen: "after comparing it with the large series in the British Museum I had not the slightest hesitation in referring it to *B. reinwardti*. In my Djampea skin the bars below are also red-brown with a grey shade or sometimes even a distinct grey band along the upper margin, but we have one from Waigiou in which these bands are of an even purer red-brown. The terminal band on the tail is broader than in some of our New Guinea specimens, narrower than in others. The wing of our bird is 322 mm. Altogether my bird has the darkest under tail-coverts of all in the Tring Museum. At present I can see no reason for separating it even subspecifically from *B. reinwardti*, but it would be valuable to get skins from Timor, Flores etc., to see whether perhaps the 'Austro-Malayan' birds differ from those of the Papuan Islands".

In the Solomon Islands — *Baza gurneyi* Rams., in New Britain — *B. bismarcki* Sharpe, and in Timorlaut — *B. timorlaoensis* Meyer, the adult of which is still unknown, have been marked off as distinct from *B. reinwardti*. *B. subcristata* Gould of Australia is also nearly allied, and *B. rufa* Schl. of the Halmahera-group is likely to cause trouble. The last seems to be distinguishable by its having the chest grey washed with rufous, and the under parts more deeply stained with that colour, as well as having the bands thereon red-brown.

As is pointed out under *B. celebensis* the habitat of *B. reinwardti* was originally stated to be Celebes, and the error was not discovered till Schlegel wrote his "Valkvogels" in 1866. This has given rise to much error and mislabelling. Dr. Finsch in his list of birds in "New Guinea" 1865, 154 indicated Celebes as a locality of the species, but was obviously misled by previous writings and the wrongly labelled specimens in the Leyden Museum. No further proof of the occurrence of the species in Celebes can be drawn from three examples of unknown origin — but included among a lot of Celebesian birdskins — examined by Prof. W. Blasius (*6*). There is no certain evidence that this species has ever occurred in Celebes.

Baza rufa Schl.

A specimen of this Moluccan species in the Dresden Museum, marked as having come from Celebes (Nr. 2197) is mentioned by Meyer, Z. ges. Orn. 1884, 272. An immature specimen of the same species is similarly labelled "Celebes" (Nr. 2196). Both were purchased prior to 1874 of Frank of Amsterdam, and bear the name of no collector, but only labels affixed by that dealer, determining them simply as "*B. reinwardtii*, Celebes". This indicates that they were bought of Frank who got his determinations from the Leyden Museum before

the distinctness of *B. rufa* was made out, that is to say before 1866, when *B. reinwardti*, owing to the original error of Temminck and Schlegel, was believed to be a Celebesian species. The conclusion to be drawn is, that the specimens were determined and the locality indicated on what were at the time sufficiently good hypothetical grounds, but which must now be regarded as almost certainly erroneous.

GENUS TINNUNCULUS Vieill.

"The Kestrels differ from the true Falcons by having a shorter bill and a much smaller and weaker foot, the middle toe without the claw being only ⅔ to ¾ the length of the tarsus. The tail is longer and the feathers graduated, the outer rectrices 1 to 1½ inches shorter than the middle pair, and the wing is shorter. The sexes differ, and the females and young have the upper parts banded black and rufous" (Blanford). They prey upon mice, insects, birds, frogs, etc., seeking their booty on the ground, hovering over it, and pitching down upon it from above. Lay 4—6 eggs. About 15 species, some migratory, others stationary, scattered over nearly the whole world.

26. TINNUNCULUS MOLUCCENSIS Jacquin. Puch.

Moluccan Kestrel.

a. **Falco tinnunculus** *(1)* S. Müll. (nec. L.), Verh. Nat. Geschied. Natunrk. Comm. 1839—44, 87 (Celebes), 209 (E. Indies); *(2)* id., Reiz. in Ind. Archip. 1857, II, 8 (Celebes).

b. **Cresserelle des Moluques** *(1)* Hombr. & Jacq., Voy. Pôle Sud, Atl. 1843, pl. I, f. 2 (Amboina); *(2)* T. & S., Faun. Jap. Aves 1845, 3 (E. Ind.).

Tinnunculus moluccensis "Schl.", Bp., Consp. 1850, I, 27 (nomen nudum); Jacquinot et Pucheran, Voyage au Pôle Sud, Zoologie, 1853, vol. III, p. 47; *(1)* Wall., Ibis 1868, 5; *(2)* Meyer, ib. 1879, 55; *(3)* Salvad., Orn. Pap. 1880, I, 37, et Agg. 1889, I, 14; *(4)* Gurney, Ibis 1881, 469; *(5)* Meyer, Verh. z.-b. Ges. Wien 1881, 760; *(6)* W. Blas., P. Z. S. 1882, 700; *(7)* Sclat., ib. 1883, 51, 194, 200; *(8)* Meyer, Isis 1884, 9; *(9)* Gurney, Diurn. B. of Prey 1884, 97; *(10)* Pleske, Bull. Acad. Petersb. 1884, 112; *(11)* W. Blas., Ztschr. ges. Orn. 1885, 220; *(12)* Guillem., P. Z. S. 1885, 562; Vorderman, N. T. Ned. Ind. 1886, 7 (sep. copy); Tristr., Cat. Coll. B. 1889, 67; *(13)* Salvad., Agg. Orn. Pap. 1889, I, 14; *(14)* M. & Wg., Abh. Mns. Dresd. 1895, Nr. 8, p. 4.

c. **Falco moluccensis** Schl., Naumannia 1855, 253; *(1)* id., Mus. P.-B. Falcones 1862, 28; *(II)* id., Valkv. 1866, 6, 47, pl. 1, f. 3, 4, 5; *(3)* id., Rev. Acc. 1873, 42; *(4)* Rosenb., Malay. Arch. 1878, 271; *(5)* Vorderman, N. T. Ned. Ind. 1884, 189.

d. **Cerchneis moluccensis** *(1)* Sharpe, P. Z. S. 1874, 583; *(2)* id., Cat. B. 1874, I, 430; id., Mitth. Zool. Mus. Dresden 1878, III, 357; H. O. Forbes, P. Z. S. 1884, 431; *(3)* Vorderm., N. T. Ned. Ind. 1895, LIV, 331.

For further synonymy and references cf. Salvadori *3, 13.*

Figures and descriptions. Hombron & Jacquinot *b I*; Schlegel *c II, c 1, c 3*; Sharpe *d 1, d 2*; Salvadori *3*; Gurney *4*; W. Blasius *6, 11.*

This species ranges from Timorlaut and the Moluccas as far as Borneo, but it varies locally within this area, the extremes of difference being found in Halmahera on the one side, and in Celebes and the Lesser Sunda Islands on the other, while some of the Moluccas, such as Buru and apparently Amboina (which furnished the type of the species) are inhabited by birds which seem to be intermediate. A little consideration will make it clear that there is no good purpose served by applying trinomials to the forms intermediate between two races — such names are not only useless and cumbersome, but also misleading since they bring with them the idea: here the species has developed into a pronounced race! The only places where trinomials may be employed without damage are where the extreme racial variations are found. In the case of the present species there is no typical subspecies. The extremes and means, as at present understood, may be identified in the following manner:

1. Tinnunculus moluccensis orientalis n. subsp.

e. **Falco moluccensis** *(I)* Schl., Valkv. Ned. Ind. 1866. 6, 47, pl. I, f. 3 (Halmahera).

Diagnosis. Under surface darker; cheeks fulvous-brown; under wing-coverts pale fulvescent brown, spotted with black.

Distribution. Halmahera-group: Halmahera, Morty, Ternate, ? Kaiva, Mareh, Tidore, Batchian.

2. Tinnunculus moluccensis occidentalis M. & Wg.

f. **Falco moluccensis** *(I)* Schl., Valkv. Ned. Ind. 1866, 6, 48, pl. 1, figs. 4, 5.

g. **Tinnunculus moluccensis occidentalis** *(1)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 2, p. 8; *(2)* Hartert, Nov. Zool. 1896, 162, 178, 589, 597; *(3)* id. ib. 1897, 159.

"Sikep burik mera", Minahassa, Nat. Coll.

"Sikep tarak take", Tondano, N. Celebes, Nat. Coll. (the young of *Spilospizias trinotatus* and of *Accipiter rhodogaster* are confused with the present bird under this name).

"Oopo", Gorontalo, Joest, Holontalo 1883, p. 106.

"Zere zere", Tjamba, S. Peninsula, Platen *11.*

Diagnosis. Under surface paler; cheeks albescent-grey; under wing-coverts white, sparingly marked with black spots.

Distribution. Celebes, Borneo (Schwaner), Java (Whitehead *g 2*), Lombok (Vorderman *d 3*, Everett *g 2*), Sumba (Riedel *5*, Doherty *g 2*), Flores, Letti (?), Timor, Timorlaut (?).

3. T. moluccensis orientalis — occidentalis.

Diagnosis. Connecting links.

Distribution. Amboina, Buru, Ceram, Goram, Peling.

General description:

Adult female. Above russet, the feathers of the head streaked with black, those of the back and wings plentifully marked with cross-bars and triangular spots of black; quills blackish with light margins, inner webs barred with russet; tail and upper tail-coverts smoke-grey, the former crossed with a broad subterminal band of black and marked with 1—9 narrow, more or less obselete, bars; tip whitish; under surface brownish fawn-colour, throat, thighs and under tail-coverts paler, breast, sides and

abdomen marked with drop- and arrow-head spots of black; under wing-coverts white or ochraceous buff spotted like the under surface.

Adult male. Like the female, but both above and below less plentifully spotted and banded with black; tail clear smoke-grey, crossed only by the broad subterminal black band.

"Iris brown; bill greyish blue; cere and skin round the eyes yellow; feet deep citron-yellow, claws black" *(M. 2)*.

Young. Appears to differ little from the female.

Measurements. Wing 210—240 mm; tail 160; tarsus 43—44; culmen from cere 15—16.

Attention was called as long ago as 1866 by Schlegel to local deviations of coloration, when it was pointed out that the supposed specimen from Borneo and two from Timor and Flores respectively agreed with those from Celebes, while the more strongly coloured race of Halmahera was also represented in the Leyden Museum in specimens from the neighbouring islands of Morotai, Ternate, Mareh, Tidore and Batchian.

In a good series intermediate specimens may occur in localities indicated for the pronounced races. For instance, we have one from the Minahassa, N. Celebes, which by its dark tawny brown tints approaches three from Halmahera, but the under wing-coverts are lighter.

A male from Timorlaut (Nr. 6693) appears to have a somewhat greyer head and the spots on the back smaller than in any others, but, as the specimen is a bad one, it is difficult to form a good judgment of its characters. This may be a hidden subspecies. Schlegel *(c II)* mentions that the Flores specimen also has smaller and fewer spots on the upperside.

In Borneo the dark Japanese form of the Common Kestrel *(Tinnunculus alaudarius)* occurs in winter (Everett, List B. Borneo, in J. Str. Branch R. A. S. 1889, 186), and the same species — probably also the same local form of it — has been obtained near Luzon at sea (Finsch & Conrad, Verh. Z. B. Ges. Wien, 1873 June 4). The statement, therefore, of Horsfield (Tr. L. S. 1821, XIII, 135) that *F. tinnunculus* belongs also to Java is likely enough to be true, although his note has always been taken as referring to *T. moluccensis*.

The food of the Moluccan, like that of the Common Kestrel is pretty varied. In Celebes Salomon Müller noted that it fed on "mice, small lizards and birds, grasshoppers etc."; v. Rosenberg speaks of it as "ein Hauptinsektenjäger"; Meyer observed that it preyed on little birds. It is possible for a bird with so varied a diet as this to remain stationary in a tropical island. As the numerous dates recorded by Schlegel and others show, the species occurs all the year round in Celebes, where it is extremely plentiful, and from a note of Dr. Fischer, recorded by Mr. Pleske, it is present also throughout the year in Ternate. Consequently, it is not surprising that in these two neighbouring localities distinguishable subspecies have arisen.

GENUS FALCO L.

The true Falcons range in size from small to medium; the wing is long and very pointed, the secondaries short, not reaching as far as the middle of the wing; bill well hooked, furnished with a tooth; tarsus short, reticulate; middle toe as long or longer than the tarsus; tail moderate, square to rounded in shape. They prey chiefly on birds, catching them on the wing. About 30 species distributed over nearly the whole world. Eggs 3—5.

+ 27. FALCO SEVERUS Horsf.

Chestnut Hobby.

Falco severus *(1)* Horsf., Tr. Z. S. 1821, XIII, 135; *(2)* Schl., Mus. P.-B. Falcones 1862, 23; *(III)* id., Valkv. Ned. Ind. 1866, 4, 45, pl. 2, f. 2, 3; *(3bis)* id., Rev. Acc. 1873, 39; *(4)* Sharpe, Cat. B. 1874, I, 397; *(5)* Brüggem., Abh. Ver. Bremen 1876, V, 454; *(6)* Bourdillon, Str. F. 1876, 354; *(7)* Hume, Str. F. 1879, VIII, 43, 81; *(8)* Sclat., P. Z. S. 1880, 65; *(9)* Legge, B. Ceylon 1880, 110; Reid, Str. F. 1881, X, 4; *(10)* H. O. Forbes, Ibis 1881, 140; *(11)* Oates, B. Brit. Burmah 1883, II, 216; Davison, Str. F. 1883, X, 333; *(12)* Everett, P. Z. S. 1889, 225; *(13)* id., J. Str. Br. R. A. S. 1889, 186; Tristr., Cat. Coll. B. 1889, 66; *(14)* Steere, List Coll. B. Philip. Is. 1890, 8; *(15)* Sharpe, Ibis, 1893, 562; *(16)* Madarasz, Aquila 1894, 88; *(17)* Bourns & Worces., B. Menage Exped. 1894, 33; *(18)* Grant, Ibis 1895, 39; *(19)* Blanf., Faun. Br. Ind. B. 1895 III, 423; *(20)* Hartert, Nov. Zool. 1896, 256, 533.

a. **Falco aldrovandi** "Reinw." *(I)* Temm., Pl. Col. 1823, Nr. 128.

b. **Falco guttatus** Gray, Ann. N. H. 1843, XI, 371.

c. **Falco rufipedioides** Hodgs., Calc. Journ. Nat. Hist. 1844, IV, 283.

d. **Hypotriorchis severus** *(1)* Gray, Gen. B. 1844, I, 20; *(2)* id., List Accip. Br. Mus. 1848, 53; *(3)* Jerdon, B. India 1862, I, 34; *(4)* Blyth, Ibis 1863, 9; *(5)* Hume, Rough Notes 1869, I, 87; *(5bis)* Wald., Ibis 1872, 98; *(6)* Holdsw., P. Z. S. 1872, 410; *(6bis)* Wald., Tr. Z. S. 1875, IX, 139; *(7)* Salvad., Ann. Mus. Civ. Gen. 1875, 643, 750; *(7bis)* Wald., P. Z. S. 1878, 937; *(8)* Salvad., Orn. Pap. 1880, I, 33; 1882, III, 507; and Agg. 1889, 14; *(9)* Gurney, Ibis 1882, 131, 153; id., Diurn. B. of Prey 1884, 102; *(10)* Pleske, Bull. Acad. Sc. Petersb. 1884, XII, 112; *(11)* Finsch & Meyer, Z. ges. Orn. 1886, 2; *(12)* W. Blas., Ornis 1888, 303; id., Ibis 1888, 373; Tristr., Cat. Coll. B. 1889, 66; *(13)* Whitehead, Ibis 1890, 43; *(14)* W. Blas., J. f. O. 1890, 138.

e. **Falco frontatus** *(I)* Schl., Valkv. 1866, pl. 2, f. 5.

For further synonymy and references see Salvad. *d 8.*

Figures and descriptions. Temminck *a I*; Schlegel *III, e I*; Sharpe *4*; Legge *9*; Salvadori *d 8*; Oates *11*; Finsch & Meyer *d 11*; Blanford *19.*

Adult. Head, neck, cheeks and ear-coverts black; quills and lesser wing-coverts also black; rest of upper surface slate-colour, palest on the rump, shafts of the feathers black; chin and throat white, slightly washed with rufous; rest of under surface dark cinnamon-rufous, almost unmarked with black; under wing-coverts like the under surface, but marked with black about the carpal joint; quills and tail below brownish grey, obscurely barred with cinnamon-grey towards their bases

(Lotta, Minahassa, 23. June 1894: Nat. Coll. — C 12237). An adult ♂ (Macassar, Wallace in the British Museum) has the bars present on the basal half of the wings, but much obliterated; tail, not barred, above blackish slate, below shining dusky; under surface of body deep cinnamon-chestnut. This description appears to apply to another specimen — from the bars being perceptible on its tail apparently a female — shot at Lotta N. Celebes 29. May 1893 by our native collectors, now in the Tring Museum.

Young. Above resembling the adult; below the dark cinnamon-ground colour is plentifully marked with streaks and spots of black, which take the form of sagittate marks and bars on the under wing-coverts; the bars on wings and tail below more distinct than in adults from the same locality (Java, C 10553, S. E. New Guinea, Nr. 8726).

A young specimen from Celebes (Tweedd. Coll. in Brit. Mus.) does not correspond as regards the tail with the above adult ♂ from Macassar, having it barred with cinnamon as in a young one from Sikkim.

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (C 10568) ♂ Calcutta	246	120	35	15.5
b. (C 10552) Java	220	108	32	13
c. (C 10553) juv. Java	217	100	31	12.5
d. (8727) ♀ S. E. New Guinea	247	112	34	15
e. (8726) ♂ juv. » »	211	98	29	13
f. (C 12237) [♀] N. Celebes	245	117	34	15.5
g. (Tring Mus.) [♀] N. Celebes	235	109	32	14

Distribution. Himalayas (Legge *9*, Salvad. *d 8*); Bengal (Blyth *d 4*); Ceylon *(9, d 8)*; ? Burmah (Oates *11*); Philippines (Cuming *d 2*), Mindanao (Everett *d 7bis*), Negros (Layard *6bis*), Mindoro (Platen in Mus. Nehrkorn), Cebu, Siquijor, Tawi-Tawi, Calamianes, Romblon, Sibuyan (Bourns & Worcester *17*), Palawan (Platen *d 12*, Whitehead *d 13*, Steere *14*), Sooloo Islands (Platen *d 14*); Borneo (Fischer *5*, Everett *15*); Tenasserim and Malacca *(d 8)*, Java (*d 8*, Forbes *10*); South Celebes Macassar (Wallace *4*, Beccari *d 7*), North Celebes, Manado (v. Duivenbode *3bis*, Nat. Coll.); Ternate (Fischer *d 10*); Halmahera *(d 8)*; Ceram *(d 8)*; Salawatti *(d 8)*; Jobi *(d 8)*; S. & S. E. New Guinea *(d 8, d 11)*; New Britain (Brown *8*).

The range of *F. severus* appears to be checked and bounded by the occurrence of two rival species of Hobby, the Palaearctic *F. subbuteo* L. on the one hand, and the Australasian *F. lunulatus* Lath. on the other. The ranges of both of these species overlap that of *F. severus*, and that of *F. lunulatus*, in particular, encroaches far into it; *F. severus* and *F. subbuteo* are found together in India, where the former, according to Colonel Radcliffe "is local, while *F. subbuteo* is migratory"; and, to the south, both *F. severus* and *F. lunulatus* have been obtained in New Britain *(d 9)* and also in Ceram and Ternate.

Whether *F. severus* is a migratory species in the East Indian Archipelago, there is no sufficient evidence to show; probably it is not such. In the cold season, however, as was noted by Blyth, "it visits the plains of Bengal, where it is somewhat rare"; in Ceylon it can only be regarded as a straggler according to Colonel Legge, who believes that it finds its way to that island during the season of migration. There is no evidence of a similar movement in the East

Indian Islands. More evidence is, however, to be desired, since the closely similar *F. lunulatus* occurs also among the same islands; and in Palawan Whitehead regards *F. severus* as a migratory bird *(d 13)*. It is much to be regretted — as has been already remarked — that the dates when specimens are shot are so rarely recorded; sufficient of them would enable ornithologists to draw conclusions as to the stationary or migratory habits of species. In the present case we have been able to find only the following:

Locality	Specimens	Months	Season	Reference
Java	3	June	Fine	*2*, *3bis*, *10*
Negros	1	February	?	*d 5bis*
Mindanao	1	April	?	*d 7bis*
Mindoro	1	October	?	Platen
Palawan	3 or more	Summer and Autumn	?	*d 12*, *d 13*, *14*
N. Celebes	1	May	Fine	Nat. Coll.
N. Celebes	1	June	Fine	Nat. Coll.
S. Celebes	1	January	Rainy	*d 7*
Finschhafen, New Guinea	1	March	Fine	Mus. Dr.

It will be seen that specimens have been obtained in one or other part of the Archipelago in summer and winter, fine season and wet; hence it is improbable that the species is migratory in the strict sense of the term, and this condition is what is wanted before local differences can be insisted upon. The three New Guinea specimens in the Dresden Museum, and four from New Guinea, Salawatti and New Britain in the British Museum, are of a blacker slaty above than is usual in Indian specimens and in two before us from Java. In the coloration of the under surface the New Guinea form agrees with the Indian one, but the under side of the wing and tail are nearly uniform dusky brown, only a few bars on the inner webs being present at the base of the primaries, while on the tail the bars are almost, or quite, completely obliterated. Indian specimens have the inner web of the quills and tail barred with cinnamon for almost their entire length, but the barring on the under side of the tail is less distinct in the adult male than in the adult female or in the young. In the adult male the tail above is almost uniform dark ashy, with a subterminal black bar; in the adult female it is distinctly barred with black throughout its length. Young specimens from India have the tail above blackish brown, not barred; below barred with cinnamon. Javan specimens, young and old, appear to run midway between those of India and New Guinea, judging from the two in the Dresden Museum. As to Celebes, the adult male in the British Museum is not to be separated from New Guinea specimens; and two since received from our native collectors are apparently similar ones; the young specimen from Celebes in the British Museum corresponds best, however, with a young bird from Sikkim as regards the markings on the tail. Javan and Celebesian birds must therefore be marked as intermediate between the geographical extreme developments of the species. Birds from the most eastern bounds of the

range of the species have departed most widely in coloration in a certain direction, and we think it advisable to distinguish the two extremes — the races of S. E. New Guinea and of India especially — as subspecies:

1. **Falco severus papuanus** M. & Wg.

Abh. Mus. Dresd. 1893 Nr. 3, p. 6.

Diagnosis. Adult: above darker; tail nearly black; below darker; remiges and tail below unbanded.

Young: wings and tail below obscurely banded, under wing-coverts covered with a network of black.

Distribution. New Guinea.

2. **Falco severus indicus** n. subsp.

Diagnosis. Adult: above paler slaty; tail brownish slaty; wings and tail below barred on the inner webs with pale cinnamon.

Distribution. India (Calcutta: Henderson — C 10568).

Intermediate forms are known to us from Java (whence the type of the species) and Celebes, and it is probable that the larger part of the East Indies are inhabited by such..

The legs and feet of *Falco severus* are stouter and stronger, and the middle toe and wings relatively shorter than in *F. subbuteo* L., the type of Boie's genus, *Hypotriorchis*. *F. severus* thus forms a link between the most typical Falcons and *Hypotriorchis*, which genus was separated from them chiefly on the ground of its possessing a long, thin, middle toe, and slender, somewhat lengthy tarsus, but these slight structural peculiarities lose all generic worth when it is seen that they hold good only for the extreme forms.

In India the food of this species is said to consist chiefly of small birds (Legge *9*), but it probably preys largely upon insects as well. Mr. de Bocarmé found that the species in Java fed chiefly on Orthoptera, the remains of which, such as the wings and legs, are to be seen in abundance on the rocks in craters to which the bird resorts *(2)*. The specimen obtained in Ceylon by Mr. Bligh was shot while hawking dragon-flies.

Colonel Legge considers *F. severus* a mountain species; it was found breeding in the Himalayas in 1860 by Col. Radcliffe, who got young birds unable to fly; Mr. Thompson gives evidence in Hume's "Rough Notes" as to its breeding in Kumaon and the Ghurlwal; Mr. Bourdillon is of opinion that it nests in Travancore in South India — all more or less mountainous provinces, and Mr. de Bocarmé found it among the volcanoes of Java as pointed out above. Nevertheless — as has already been remarked — Blyth observes that it visits the plains of Bengal in the cold season and, as it has been also shot at Macassar, it frequents the plains in Celebes too.

In almost all parts of its range *F. severus* appears to be a rare species. In Celebes it certainly is so. It was not included in the large collections sent from Celebes by Dr. Fischer to the Darmstadt Museum, nor in those of

v. Duivenbode, Riedel and Platen investigated by Prof. W. Blasius; neither was it obtained there by Meyer during his stay of about twelve months, nor by Dr. Guillemard during the cruise of the "Marchesa", nor by the older travellers. Only three naturalists were more successful, two or more specimens were shot at Macassar by Mr. Wallace, from whom the British Museum received its two specimens (? the same); another was obtained at the same place by Beccari. There is also a specimen from Celebes in the Norwich Museum, as we learn from Mr. Gurney. The only record of its occurrence in North Celebes appeared to consist in the single specimen in the Leyden Museum, until two specimens from Lotta near Manado were sent to us in 1894. Possibly its rarity in collections has something to do with the difficulty of invading its mountain haunts.

† 28. FALCO PEREGRINUS (Gerini).

Peregrine Falcon.

The Peregrine Falcon has developed some considerable differences of coloration in certain areas of its range and has been divided into five species or subspecies, as follows:

1. The typical F. peregrinus.

a. **Accipiter Falco peregrinus** Briss., Orn. 1760, I, 321.

b. **Accipiter peregrinus** Gerini, Orn. Meth. Dig. 1767, I, 55, pl. 23, 24 (see Seebohm *c 7*).

c. **Falco peregrinus** Tunstall, Orn. Brit. 1771, I; *(1)* Dresser, B. Europe VI, 31, pl. 372 (1876); *(2)* Legge, B. Ceylon 1880, 101; *(3)* Salvad., Orn. Pap. 1880, I, 31; *(4)* Scully, Ibis 1881, 416; *(5)* Gurney, Ibis 1882, 292—304, 438; *(6)* Oates, B. Brit. Burmah 1883, II, 214; *(7)* Seebohm, Brit. B. 1883, I, 23, pl. 3 (egg); *(8)* Gurney, Diurn. B. of Prey 1884, 106; *(9)* Styan, Ibis 1887, 223; *(10)* Sharpe, Ibis 1888, 195; *(11)* W. Blas., Ornis 1888, 303; *(12)* Whitehead, Ibis 1890, 43; *(13)* Wiglesw., Aves Polyn. 1891, 1; *(14)* Styan, Ibis 1891, 489.

d. **Falco communis** Gm., 1788; *(1)* Schl., Valkv. 1866, II, 44, pl. 1, f. 1; *(2)* id., Rev. Acc. 1873, 32 pt.; *(3)* Sharpe, Cat. B. 1874, I, 376; *(4)* Rosenb., Malay. Archip. 1878, 271; *(5)* Sharpe, P. Z. S. 1881, 790; *(6)* id., Ibis 1889, 75; *(7)* Everett, J. Str. Br. R. A. S. 1889, 186; *(7bis)* Steere, List Coll. B. Philip. Is. 1890, 7; *(8)* Sharpe, Ibis 1890, 274; *(9)* id., Bull. Brit. Orn. Club 1892, II, Nov.; *(10)* Ribbe, Ver. Erdk. Dresden XXII, 1892, 168; *(11)* Sharpe, Ibis 1893, 116, 559; *(12)* Tacz., Faun. Orn. Sib. Orient. 1891, I, 77.

For synonymy see Sharpe *d 3*; Legge *c 2*; Salvad. *c 3*; Oates *c 6*; Seebohm *c 7*.

Figures and descriptions. Schlegel *d I*; Dresser *c I*; Seebohm *c 7*; Sharpe *d 3*; Gurney *c 5*; etc., etc.

Osteology. Giebel, Z. ges. Naturw. 1858 V/VI, 43 (hyoid); Magnus, Knoch. 1868 pl. XVII, III, fig. D (sternum); id., Vogelkopf. 1870, III, 11 (lacrymal); Milne-Edw., Ois. foss. 1867—71, pl. 179—181 (fragments); Eyton, Osteol. Av. 1867—75, pl. IIIA (skel.), pl. IIA, f. 3 (metatars.); pl. VIA, f. 5 (pal. bones), pl. VA, f. 4 (pelvis), pl. VIIA, f. 2 (coracoids, etc.), pl. IV, f. 3 (base cran.); Parker, Tr. L. S. 1875 *(2)* I. pl. 25, ff. 12, 13 (vomer); Fürbringer, Unters. 1888 III, 6, 103, 104, IV, 23, 131, VI, 83 (clavicula, etc.).

Adult. Head, neck and primaries dusky brown; rest of upper plumage slaty grey, each feather crossed with several bars of dusky brown; below white washed with buff, under side of wings, sides, abdomen, thighs and under tail-coverts closely barred with brown, on the breast a few drop-shaped brown spots; hinder part of cheeks usually white.

Young. Above brown, all the feathers with pale margins; below white, marked from below the throat downwards with drops and streaks of brown, which tend to form into bars on the flanks.

	Wing	Tarsus	Middle toe
Small ♂ (Sumba)	312	43	44.5
Large ♀ (Spain)	375	53	56

(Gurney *c 5*).

Distribution. Europe, Africa, Asia, (?) America (see Legge *c 2*); Philippines (Salvad. *c 3*, Steere *d 7bis*), Palawan (Whitehead *c 10*, Platen *c 11*); Borneo (*c 3*, *d 7*, Everett *d 9*, *etc.*); Bangka *(c 3)*; Sumatra *(c 3)*; Java *(c 3)*; Sumba (Mus. Norw. *c 5*); (?) N. Celebes (Rosenb. *d 4*); Ternate *(c 3)*; Ceram *(c 3, d 10)*.

2. Falco peregrinus melanogenys (Gld.).

e. **Falco melanogenys** *(1)* Gld., P. Z. S. 1837, 139; *(II)* id., Syn. B. Austr. 1838, pl. 40, fig. 2; *(III)* id., B. Austr. 1848, I, pl. 8; *(4)* Sharpe, Cat. B. 1874, I, 385; *(5)* Gurney, Ibis 1882, 302—304; *(6)* W. Blas., "Braunschw. Anzeiger", 1886 March 3; *(7)* Salvad., Orn. Pap. Agg. 1889, I, 14; *(8)* North, Nests & Eggs B. Austr. 1889, 16, pl. III, f. 4 (egg); *(9)* Styan, Ibis 1891, 489; *(10)* Hartert, Nov. Zool. 1896, 597.

f. **Falco communis** *(I)* Schl., Valkv. 1866, 2, 44, pl. 1, f. 2 (tantum).

g. **Falco peregrinus** *(1)* Meyer, V. z.-b. Ges. Wien 1881, 760.

g[1]. **Falco melanogenys** subsp. Gurney, Diurn. B. of Prey 1884, 107.

For synonymy see Sharpe *e 4*; Salvad. *e 7*.

Figures and descriptions. Gould *e 1*, *e II*, *e III*; Schlegel *f I*; North *e 8*; Sharpe *e 4*; Gurney *e 5*.

Diagnosis. Differs from the typical *peregrinus* in having nape and sides of head black; the black transverse bars on the under surface of adult specimens narrower, more regular and, generally, closer together; the outer and inner toes apparently a little longer in relation to the middle toe; size a little smaller.

Measurements.

	Wing	Tarsus	Middle toe
Small ♂ (Australia)	296	39	48
Large ♀ (Philippines)	348	51	56 (Gurney *e 5*).

Distribution. Australia; Tasmania; New Caledonia; New Hebrides; Fiji Islands, — Viti Levu; New Guinea, Aru, New Britain, Jobi, Java, Sumatra, Borneo, Philippines (fide Salvad. *e 7*); Sumba (Riedel *g 1*); North Celebes (Platen *e 6*); Lombok — seen only (Everett *e 10*). It has also been recorded from China (*e 9*, Rickett, Ibis 1894, 223), but the bird seems to have been *F. peregrinator* (cf. Grant *i 3*).

3. Falco peregrinus ernesti (Sharpe).

h. **Falco melanogenys** *(1)* Gurney (nec Gld.), Ibis 1882, 302, 304.

i. **Falco ernesti** *(1)* Sharpe, Ibis 1894, 545; *(2)* Grant, Ibis 1895, 438; *(3)* id., Ibis 1896, 529.

j. **Falco atriceps** *(1)* Eagle Clarke (nec Hume), Ibis 1895, 529.

Descriptions. Under the above references.

Diagnosis. Blacker than *F. p. melanogenys*; under surface shaded with cinereous; under wing-coverts and axillaries black, barred with small white lines (Sharpe *i 1*).

Distribution. Borneo (Pretyman *h 1*, Hose *i 1*), Luzon (Whitehead *i 2*), Negros (Keay *j 1*, Whitehead *i 3*), Malicollo, New Hebrides (Wykeham Perry *i 2*). This is supposed by Sharpe to be the resident form in the East India Islands.

4. Falco peregrinus anatum (Bp.).

k. **Falco anatum** Bp., Comp. List B. Eur. & N. Am. 1838, 4.

l. **Falco peregrinus anatum** *(1)* Ridgw., Man. N. Am. Birds 1887, 247.

Adult. "Chest usually immaculate" (Ridgw. *j 1*).

Young. "More deeply colored, with ground color of lower parts frequently deep ochraceous" (Ridgw. *j 1*).

Distribution. "Whole of America south as far, at least, as Chili; eastern Asia?" (Ridgw. ib.).

5. Falco peregrinus pealei Ridgw..

m. **Falco polyagrus** pt. Cass., B. Calif. 1853, pl. 16 (hinder figure only), (fide Gurney, Ridgw.).

n. **Falco peregrinus pealei** *(1)* Ridgw., Landb. N. Am. 1874, III, 137; *(2)* Gurney, Ibis 1882, 297, 298; Ridgw., l. c. note; *(3)* Gurney, Diurn. B. of Prey 1884, 106; *(4)* Ridgw., Man. N. Am. Birds 1887, 247.

Adult. "Top of head deep slaty, or plumbeous slate, uniform with back; chest heavily spotted with blackish, and dusky bars of remaining under parts very broad" (Ridgw. *n 4*).

Young. "With lower parts sooty black, streaked with pale buffy, or buffy white; the feathers of upper parts without rusty margins" (Ridgw. *n 4*).

Distribution. "Aleutian Islands, west to Commander Islands and south along Pacific coast to Oregon" (Ridgw. ib.).

Of these five subspecies the three first named only concern the ornithology of Celebes.

Taking first the typical *F. peregrinus* into consideration it appears that the only authority for the occurrence of this species in Celebes is v. Rosenberg, who remarks that it is rare there, but that he got a fine specimen in Kema in the North. As, however, he adopts the nomenclature of Schlegel, who did not discriminate between *F. peregrinus* and *melanogenys* and had not recognised *F. ernesti*, it is not possible to say to which race v. Rosenberg's specimen belonged; and, if it is still extant, we do not know in what museum or collection it is to be found. *F. peregrinus* has been obtained in islands lying on every side of Celebes, — the Philippines, Borneo, Sumba, Ceram, Batjan and Ternate, so that it is impossible that it could fail to occur in Celebes as well, though satisfactory evidence on this point is wanting. In Ceram Mr. Ribbe found *F. communis* [? *melanogenys* or *ernesti* in part] and *moluccensis* very plentiful both in the forest as well as on the coast and mountains. There is considerable reason for believing that this race is only a winter visitor to the East Indian Archipelago. It is stated to be a migrant in India, though a good many specimens remain there throughout the year *(c 2)*, and Mr. Oates is inclined to regard it as a

resident in Burmah. The southward migration through Gilgit and the Hindoo Koosh has been observed by Major Scully to take place in October and the return in April *(c 4)*. About the lower Yangtse Mr. F. W. Styan speaks of it as a common resident species, but an influx of specimens from the North takes place in autumn. Further south in China it is a common winter visitor, at Foochow, Mr. De la Touche found it abundant from October to spring. In North Borneo and Labuan birds of this race, according to Mr. Everett, appear in the N. E. monsoon, "and are doubtless regular winter migrants, probably from China" *(d 7)*. Mr. Whitehead, also, reports it to be a winter migrant to Palawan.

The Australian Peregrine, *melanogenys*, is less well understood. It is known to breed in Australia laying two or three eggs in September — October, the Australian spring *(e 8)*. At this time of year a specimen has been obtained in Sumatra by Beccari, and Bocarmé's notes show that a form of Peregrine Falcon breeds in Java, making its nest in trees in the mountain forests; but, as Schlegel, who published these remarks, did not distinguish the different races of *F. peregrinus* by name, it is not certain to which race — if to only one — Bocarmé's observations refer. Dr. Sharpe believes that Java and Borneo are inhabited by a peculiar local race of Peregrines (*ernesti*); Seebohm considered that *F. melanogenys* breeds in Sumatra and Java as well as Australia *(c 7)*. In the lower Yangtse Basin, Mr. F. W. Styan has recorded a pair of *F. melanogenys* as breeding there, but the dark form in South China has been identified by Mr. H. H. Slater with the Indian *F. peregrinator* Sundev. *(j 1, i 3)*. *Falco ernesti* was observed breeding in Negros by Mr. Whitehead. Any conclusion as to a possible migration from Australia during the winter of that country — the months of our summer — cannot be made, owing to the absence in literature of actual observations and of dates when specimens were shot. The bird is either decidedly rare in the archipelago, or more difficult to obtain than the generality of birds of prey.

That *F. melanogenys* occurs very rarely in Celebes — possibly as a straggler — is evident from the fact that the only specimen of which there is any record from this island, is one which Prof. W. Blasius laid before a meeting of the Naturhistorischen Verein at Brunswick in 1886, as reported in a newspaper account of the sitting *(e 6)*. It is possible, however, that v. Rosenberg's note, stating that he found *F. communis* not common in the island *(d 4)* may concern this form of Peregrine.

A closer examination of the specimen from Sumba sent by Dr. Riedel to the Dresden Museum has served to show us that the bird belongs to the southern race, and not to the northern one with which it was at first identified. Therefore both subspecies occur on Sumba *(c 5)*.

FAMILY PANDIONIDAE.

The family contains only one species, the Osprey, peculiar by its having the outer toe reversible, and no aftershaft to the feathers. The tarsus is naked (except at the top anteriorly) and covered with very rugose small scales. The claws very long, and curved almost to a semicircle; the toes furnished below with pads covered with small, strong, sharp points or spines, adapted for holding the fish upon which it preys. Size large medium; wing very long, extending beyond the tip of the tail. Migratory and stationary. Eggs 2—3. Almost cosmopolitan in range, but varies locally to some extent.

GENUS PANDION Sav.

Description as for the family.

+ 29. PANDION HALIAETUS (L.).

Osprey.

The genus *Pandion* contains only one species, *P. haliaetus*, which is almost cosmopolitan in its range. In the Old World, in America, and in Australia some differences of size and coloration have arisen, which makes it advisable to adopt the three subspecies already distinguished.

1. The typical Pandion haliaetus.

a. **Falco haliaetus** Linn. 1766; *(I)* Naum., Vög. Deutschl. 1822, I, 241, pl. 16.

b. **Pandion haliaetus** Less., Man. d'Orn. 1828, I, 86; *(I)* Gld., B. Eur. 1837, pl. 12; *(2)* Schl., Mus. P.-B. Aquilae 1862, 22 pt.; *(III)* id., Valkv. 1866, 12, 52, pt., pl. 3, f. 3; *(4)* Newton, Yarrell's Brit. B. 1871, I, 34; *(5)* Schl., Rev. Acc. 1873, 123 pt.; *(6)* Sharpe, Cat. B. 1874, I, 449; *(7)* Salvad., Cat. Ucc. Borneo 1874, 7; *(VIII)* Dresser, B. Europe VI, pls. p. 139 (1876); *(9)* Legge, B. Ceylon 1880, 122; *(10)* Gurney, Ibis 1882, 594—598; *(11)* Seebohm, Brit. B. 1883, I, 56, pl. 3 (egg); *(12)* Oates, B. Brit. Burmah 1883, II, 220; *(13)* W. Blas., J. f. O. 1883, 118; *(14,* Gurney, Diurn. B. of Prey 1884, 112; *(15)* W. Blas., Ornis 1888, 539; *(16)* Sharpe, Ibis 1889, 75; *(17)* Everett, J. Str. Branch R. A. S. 1889, 187; *(18)* Whitehead, Ibis 1890, 43; *(19)* Sharpe, t. c. 274; *(20)* Styan, Ibis 1891, 486; *(21)* De La Touche, Ibis 1892, 483; *(22)* Meyer & Helm, Jhrsb. Orn. Sachsen 1892, 79; *(23)* Tacz., Faun. Orn. Sib. Orient. 1, 1891, 52; *(24)* M. & Wg., Abh. Mus. Dresd. 1896 Nr. 2, p. 8.

For synonymy and further references see Sharpe *b* 6.

2. Pandion haliaetus leucocephalus (Gld.).

c. **Pandion leucocephalus** *(1)* Gld., P. Z. S. 1837, 138; *(II)* id., Syn. B. Austr. 1838, pt. III, pl. 6; *(III)* id., B. Austr. 1848, I, pl. 6; *(4)* Sharpe, Cat. B. 1874, I, 451 (sbsp.); *(5)* Meyer, Ibis 1879, 56; *(6)* Salvad., Orn. Pap. 1880, I, 11 and Agg. 1889, 11;

(7) Gurney, Ibis 1882, 595—598; *(8)* id., Diurn. B. of Prey 1884, 113 (subsp.?); *(9)* Meyer, Isis 1884, 6; *(10)* North, Nests & Eggs B. Austr. 1889, 23, pl. 5, f. 1, 2 (eggs); *(11)* Steere, List Coll. B. Philip. Is. 1890, 8; *(12)* Meyer, Abh. Mus. Dresden 1893, 3, p. 4.

d. **Pandion haliaetus leucocephalus** *(1)* Brüggem., Abh. Ver. Bremen 1876, V, 45; *(2)* Wiglesw., Aves Polyn. 1891, 1; *(3)* Hartert, Nov. Zool. 1896, 178.

For synonymy and further references see Salvadori *c 6*.

3. Pandion haliaetus carolinensis (Gm.).

e. **Pandion carolinensis** (Gm. 1788); *(1)* Audubon, B. N. Am. pl. 81 (1831); *(2)* Gurney, Ibis 1882, 595—598; *(3)* id., Diurn. B. of Prey 1884, 113 (subsp.?).

f. **Pandion haliaetus carolinensis** Ridgw., B. N. Am. 1874, III, 182; *(1)* id., Man. N. Am. Birds, 1887, 254.

Key to distinguish the 3 subspecies:

A. Below purer white than in the other races, breast often immaculate; "shafts of the tail-feathers continuously white": . . . . *P. haliaetus carolinensis.*

Distribution. "Temperate and tropical America in general, north to Hudson's Bay and Alaska" (Ridgw. *f 1*).

B. Breast always more or less varied with brown:

a. Larger; wing from 437 (♂)—528 mm (♀) (ex Gurney *b 10*); crown of head usually more strongly marked with brown streaks than in *leucocephalus*: . . . . . *The typical P. haliaetus.*

Figures and descriptions. Naum. *a I*; Gld. *b I*; Dresser *b VIII*; Sharpe *b 6*; Legge *b 9*; Gurney *b 10*; Seebohm *b 11*; etc. etc.

Osteology. Selenka, Bronn's Kl. u. Ord., pl. XVI, f. 7 (sternum); Milne-Edw., Ois. Foss. 1867—71, pl. 179; Eyton, Ost. Av. 1867—75, pl. III, f. 10 (frons), pl. V, f. 5 (pelvis); Blanchard, Ost. Ois. 1859, pl. II, 7, 8; Färbringer, Unters. 1888, I, 20; III, 102; VI, 81 (shoulder); Giebel, Z. ges. Naturw. 1858, V/VI, 49.

Distribution. Europe; Africa; Asia, as far south as Java (♂ with wing 450 mm — Vorderman), Borneo *(b 16, b 17)*, Palawan *(b 18)*, and the Sangi Islands *(b 15)*; Celebes (in Dresden Mus.).

b. Smaller; wing 386—493 mm; crown of head sometimes nearly, or quite, pure white: . . . . . *P. haliaetus leucocephalus.*

Figures and descriptions. Gould *c 1, c II, c III*; Schl. *b III*(?); Gurney *c 7*; North *c 10*. Eyton, Ost. Av. 1867—75, pl. I (skel.), pl. II, f. 1 (metatarsus), pl. III, f. 2 (sternum).

Distribution. New Zealand *(b 11)*; Australia and New Caledonia throughout the intervening islands to Celebes and Sangi (Salvad. *c 6*); Banggai Id. (Nat. Coll.); Talaut Is. (Nat. Coll.); Bawean Islands (Schl. *b 2*); S. E. Borneo *(b 2)*; Philippine Islands — Marinduque (Steere *c 11*); Pelew Islands (Mus. Hamburg *d 2*).

The species *P. haliaetus* may be generally described as follows:

Adult. Head and neck white, with dark brown centres to the feathers present in greater or less abundance on the crown and hind neck; quills black; all other parts of the upper surface dull dark brown, the margins of the feathers somewhat paler;

ear-coverts blackish brown continued into a streak down the sides of the neck; chin and throat white, often marked with brown shaft-streaks; chest brown, sometimes pure white; under wing-coverts nearest the body white, the outermost ones brown with white margins; remaining under parts of body — except the axillaries, which are spotted with brown — pure white.

Iris yellow; cere blue; feet blue or bluish white.

Young. Above darker, richer brown than the adult, all the feathers of the back, upper tail- and wing-coverts terminally margined with white or fulvous; crown of head and neck much more saturated with blackish brown than in the adult; numerous cross-bars — imperceptible in the adult — plainly apparent on the tail of the young.

Distribution of the species. Almost cosmopolitan. Absent in the southern countries of S. America and in the islands of the Pacific Ocean, except two or three (cf. Dresser *b VIII*, Newton *b 4*, Legge *b 9*, Salvadori *c 6*).

The American form of the Osprey, *P. carolinensis* does not further concern this work; both of the other two forms, the typical Osprey of the Old World and the smaller Australian bird in our opinion occur in the Celebesian area.

Schlegel and Sharpe include Celebes within the range of the *typical* form *(b 5, b 19)*; Brüggemann, Gurney, Meyer, Blasius and Salvadori within that of the Australian form *(d 1, b 10, c 5, b 13, c 6)* and Schlegel and Blasius *(b 15)* identify the Sangi Islands as a locality for the *typical P. h.*, Gurney and Salvadori as a locality for *P. h. leucocephalus*, — so, also, Meyer *(c 9)*. These conflicting opinions will be answered in the future in one of two manners — either one or both forms will be found to be migratory visitors to Celebes and Sangi; or, the birds inhabiting these islands will be found to present an interconnected, intermediate race between the northern and southern Ospreys. If migratory, then the northern race may be expected to occur in Celebes and Sangi in the months of our winter and the southern race during the months of the Australian winter, i. e. in our summer. The northern Osprey is known to migrate south in autumn, passing the winter south of about 45° N. lat. *(b 22)*; in Ceylon it is only present during the cool season *(b 9)*, and this also appears to be the case in Burmah *(b 12)* and possibly throughout all countries south of the Himalayas. No record of its nesting in India was known to Mr. Oates in 1889. In Borneo three specimens of the northern Osprey have been obtained in December by Mr. Whitehead, who believes it is a migrant there — i. e. in Northern Borneo *(b 16)*, and it is also marked by him as migratory in Palawan *(b 18)*. Another was obtained at Sarawak by Beccari on March 3rd, 1867 *(b 7)*. A fifth mentioned by Schlegel *(b 2)* was killed at Pagattan at the S. E. extremity of the island, and has the wing only 420 mm ("15½ French inches") long; thus evidently — though a male — belonging to a smaller race. For the Sangi Islands and Celebes the few specimens, which have been properly dated, run as follows:

Sangi

a.	♂	wing 420 mm	9. Aug. 1886 (Platen *15*)
b.	♂	» 495 »	20. Jan. 1887 (Platen *15*)
c.	♀	» 485 »	20. Jan. 1887 (Platen *15*)
d.	♀	wing 437—470 mm	4. Aug. 1865 (Rosenb. *b 5*)
e.	♀	wing 437—470 mm	3. Nov. 1866 (Rosenb. *b 5*)
f.	♀	wing 437—470 mm	24. Jan. 1866 (Hoedt *b 5*)

Talaut

g.	1	wing 435 mm	Autumn 1896 (Nat. Coll.)

North Celebes

h.	♂	» 422 (or 429) mm	10. Oct. 1863 (Rosenb. *b 5*)
i.	1	» 430 mm	May 1871 (Meyer, Dresd. Mus.)
j.	1	» 450—470 mm (2 or more specimens)	March 1871 (Meyer *c 5*)
k.	1	» 450 mm	12. May 1893 (Nat. Coll., Dr. M.)
l.	1	» 420 »	24. Apr. 1893 (Nat. Coll., Dr. M.)
m.	1	» 470 »	11. Dec. 1894 (Nat. Coll., Dr. M.)
n.	1	» 470 »	27. Feb. 1894 (Nat. Coll., Dr. M.)
o.	1	» 450 »	March 1895 (Nat. Coll., Dr. M.)
p.	1	» 430 »	March 1895 (Nat. Coll., Dr. M.)
q.	1	» 426 »	Feb. 1894 (Nat. Coll., Dr. M.)

East Celebes and Banggai Id.

r.	2	» 430 and 470 mm	May—Aug. 1895 (Nat. Coll., Dr. M.)
s.	1	» 430 mm, Banggai Id.	May—Aug. 1895 (Nat. Coll., Dr. M.)

Prof. W. Blasius identifies specimen *a* with *b* and *c* as belonging to the northern race; but its size would seem to indicate that it belongs to the smaller one. Our own specimens of the larger race have winter dates. The other two were shot in our winter. On the whole the above facts seem to indicate that the larger form is a migrant, and the smaller a resident in Celebes and Sangi.

A change of disposition in this species, as recorded by Mr. C. Ribbe in Ceram, also renders it very probable that the southern form is resident in the Archipelago: "One of the most importunate birds of prey, which I met with in the Indies, was *Pandion haliaetus*; this species, elsewhere, in consequence of sharp persecution, a very shy bird, was bold and impudent on the coast of Ceram, where I was able to observe it daily. If the fishermen do not look out, it will steal the fish in their boats; when fishing with the line is being done, it will watch for the moment when the fish is drawn out, and pitch down upon it. Once, on a larger fishing expedition in which I joined, it happened that an Osprey paid for its boldness with its life, for it was beaten to death with sticks by the boatmen". (Jb. Ver. Erdk. Dresden, XXII 1892, 168).

The northern Osprey lays at the end of April or beginning of May *(b 11)*; in Australia, the smaller form breeds from July to October *(c 10)*. A northern bird, staying behind in the East Indian Archipelago, might thus be prevented from interbreeding with the smaller race. The food of this species consists entirely of fish, caught by plunging into the water.

? Gyps sp.

In the Nat. Tdschr. Ned. Ind. 1876, XXXVI, 381, van Musschenbroek mentions his having encountered a Vulture at Kwandang, North Celebes, without his being able to identify the species. He suggests *Gyps indicus*.

ORDER STRIGES.

The Owls are nocturnal or crepuscular in habits and are best characterized by their eyes, which are very large and not placed laterally on the sides of head as in most other birds, but directed forwards, each eye being surrounded by a disk of feathers radiating from it. The four toes are placed two in front, one behind, and the outer one laterally on the foot; the last capable of being completely turned backwards. The plumage is very soft and fluffy, the most prevalent tints being brown — rufous brown or yellow-brown, — grey, and white; and the patterns are often completely broken up, chequered and vermiculated. The round, white eggs are usually laid in cavities in trees or rocks. The larger species prey upon vertebrates of various kinds, some on fish, many of the small Owls on insects. In size the Owls vary from that of a Lark to that of an Eagle.

FAMILY ASIONIDAE.

The sternum furnished with a manubrial process; the furcula, not attached to the keel of the sternum, often consists of but two stylets which do not even meet one another, the posterior margin of the sternum with two pairs of projections, one pair on each side, with corresponding fissures between them; the tarsus furnished with a bony ring or loop bridging the channel holding the common extensor tendon of the toes (Newton, Dict. B. 672). Basal and second joints of middle toe subequal in length (Blanford).

GENUS NINOX Hdgs.

Owls of rather small size, facial disk wanting, causing a very Accipitrine appearance; bill moderate, the nostrils formed by semi-tubular swellings of the cere placed well forward; wings long; tail long, more than 3 times the length of the tarsus; toes bristly, rather long, the soles covered with rough horny points and laterally fenced with stiff bristles; tarsus feathered to an extent varying in different species. They prey upon insects, small mammals, birds, lizards. Eggs 2—4. About 30—40 species, one at least of them migratory, distributed from India and China, to Australia, New Zealand and Madagascar.

† * 30. NINOX OCHRACEA (Schl.).

Ochraceous Hawk-owl.

Plate IV.

a. **Noctua ochracea** *(1)* Schl., Ned. Tdschr. Dierk. 1866, III, 183; *(2)* id., Rev. Noctuae 1873, 22; *(3)* Rosenb., Malay. Archip. 1878, 271, 583.

b. **Athene ochracea** Wall., Ibis 1868, 23; Gray, HL. 1869, I, 41; Wald., Tr. Z. S. 1872, VIII, 38.

Ninox ochracea *(1)* Sharpe, Ibis 1875, 258; *(II)* id., Cat. B. 1875, II, 167, pl. XI, fig. 2; *(3)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 2, p. 8.

"Totosik", Lotta, Minahassa, Nat. Coll.

"Keketi", Tonkean, E. Celebes, Nat. Coll.

Figures and descriptions. Sharpe *II*; Schlegel *a 1*, *a 2*; Rosenberg *a 3* (ex Schl.).

Adult. Above dark brown with a chestnut wash, more dusky on the head; the underlying scapulars with large patches of white, chiefly on the outer webs of the feathers; greater and middle wing-coverts marked on the outer webs with a few spots of white, often concealed; quills brown, outer webs washed with rufous, the secondaries notched somewhat deeply on the inner and slightly on the outer webs with white, the remains of which are perceptible on the outer edge of the primaries; tail brown like the quills, marked on the inner webs (except on the middle pair) with notches of white, deepest towards the base of the feathers — these white notches mark the spaces between obscure bars, of which about seven may be made out on the middle feathers; — bristle-plumes of the forehead and lores whitish with black shafts, which are continued into fine hair-like points reaching considerably beyond tip of bill; above eye and malar region, whitish; under surface tawny raw-umber, darkest on the chest and gradually becoming lighter, until on the under tail-coverts it is buff; under wing-coverts light cinnamon marked with brown near the edge of the wing, the greater series and inner webs of quills below notched with white (Lotta, North Celebes, 4. Dec. 1894: Nat. Coll. — C 13865).

"Iris somewhat dark brown, bill brownish white" *(a 1)*.

Measurements. Wing 184 mm; tail 108; tarsus 27; middle toe without claw 22.5; culmen from cere 14.

A specimen in the Brit. Mus. measures: wing 200 mm; tail 127; tars. 25 (Sharpe).

Young. Differs from the adult in having the under surface white or whitish; throat and jugulum dark brown; upper parts dark brown, without any chestnut hue (juv. Main, N. Celebes, Feb. 1894: Nat. Coll. — C 13240).

Measurements.	Wing	Tail	Tarsus	Bill from cere
a. (10439) ad. Gorontalo (Riedel)	184	108	27	14
b. (C 13865) ad. Minahassa, 4. XII. 94 (Nat. Coll.) . . .	189	101	26.5	12
c. (C 14357) ad. E. Celebes, V.-VIII. 95 (Nat. Coll.) . .	192	100	27.5	13
d. (C 13240) juv. Minahassa, Feb. 94 (Nat. Coll.) . . .	178	85	27	12

Distribution. North Celebes: Gorontalo District — Negri-lama (Rosenb. *a 1*) and Gorontalo (Riedel in Mus. Dresden); Minahassa (v. Duivenb. *a 2*, Nat. Coll.); Tonkean, E. Cel.

This little Owl is a somewhat rare species in collections. It was discovered by von Rosenberg at Negri-lama on the coast of the Gulf of Tomini in 1863.

There are now examples in the Dresden, Leyden, British, Tring, and apparently, Vienna Museums. It is nearly allied to the Little Owl of the Philippines, *N. philippensis* Bp., which differs from it in having the upper wing-coverts spotted, the tail shorter, etc. Another species, showing much similarity in tone of coloration, but having the under surface marked with cross-bars instead of uniform or with indistinct stripes, is the *Ninox hantu* of Buru, figured by Dr. Sharpe on the same plate with *N. ochracea*.

31. NINOX SCUTULATA (Raffl.).

Brown Hawk-owl.

This species apparently consists of four races. We have not been able to investigate those of the Indian countries, but accept the views thereon of Schlegel and Dr. Sharpe, with the corrections of Mr. Hume and more recently of Mr. Blanford (Bull. B. O. C. 1894 XVIII, p. XLII, Ibis 1894, 526; Faun. Br. Ind. B. III 1895, 309). The races may be diagnosed as follows:

1. The typical Ninox scutulata.

Diagnosis. Size medium, wing 197—210 mm; 4th primary scarcely longer than the 3rd and 5th, which are about equal in length (Schlegel *a I*).

Distribution. India and Ceylon, south-eastwards as far as Java and Borneo.

2. Ninox scutulata lugubris (Tickell).

Diagnosis. "Rather paler, with a greyer head" (Blanford).

Distribution. "Found in India and Burmah generally, chiefly in the less damp parts of the country" (Blanford). The typical form, on the contrary, is believed by Mr. Blanford to belong to those parts where the rainfall is heavier — Malabar, Ceylon, parts of Burmah, etc. (Faun. Br. Ind. B. III 1895, 311).

3. Ninox lugubris affinis (Tytler).

Diagnosis. A small race: wing 168—193 mm (Blanford).

Distribution. Andaman Islands.

4. Ninox scutulata japonica (T. & Schl.).

Diagnosis. Size large, wing c. 218—235 mm; 3rd and 4th primaries about equally long, or the third a trifle the longest, the 5th (according to Schlegel and W. Blasius) much shorter and nearly equal to the 2nd. (In our specimens with three exposed bands on the tail this seems to hold good for the 5th primary, but in three of our four with more rufous tails and four exposed bands, the 5th is only about 10 mm shorter than the 3rd, instead of about 20 mm shorter, like the 2nd; in the fourth example the fifth quill is missing. Prof. W. Blasius measurements *(i 3)* show however, that the wing-formula is subject to great variation, the 5th quill being in one specimen (a female) only 85 mm shorter than the longest, in another specimen 21 mm

shorter, both examples being from the same locality, Great Sangi, and the specimens before us also, most indeed moulting, seem to have no great stability in the quill-lengths. We have noticed this in other Owls.)

Distribution. Japan *(a I, d 1)*; Loo-choo Islands *(g 4, h 8)*; S. E. Siberia and China from the Amoor southwards *(g 1, h 1, h 9, h 10, i 1)*; migrating in winter to the Philippine Islands (Platen *i 2*, Steere *j 1*, Whitehead *h 7*); Borneo *(c 2 g 5)*; Talaut Is. — Kabruang and Salibabu (Nat. Coll.); Sangi Islands (Rosenb., Hoedt *e 1*, Meyer *h 4*, Platen *i 1*); Tagulandang (Nat. Coll); — Celebes, N. Peninsula (Rosenb. *e 1*, Meyer *c 3*), S. Peninsula, Bonthain (Weber *h 12*); Sula Mangoli (Hoedt *e 1*); Kalao (Everett *l 4*); Ternate (Rosenb. *e 1*, Fischer *h 5*); Flores (Wallace *f 1*).

The following synonymy belongs to the last-named subspecies:

Ninox scutulata japonica (T. & Schl.).

a. **Strix scutulata japonica** *(I)* Temm. & Schl., Faun. Jap. Aves 1845, 28, pl. 9 B.

b. **Athene japonica** Bp., Consp. 1851, I, 41.

c. **Ninox japonicus** *(1)* Bp., Rev. Zool. 1854, 543; *(2)* Wald., Tr. Z. S. 1872, VIII, 40; *(3)* Meyer, Ibis 1879, 57; *(4)* Sharpe, Ibis 1889, 80; id., ib. 1890, 274; *(5)* Campbell, ib. 1892, 243.

d. **Noctua hirsuta japonica** *(1)* Schl., Mus. P.-B. Striges 1862, 25.

e. **Noctua hirsuta,** partim, *(1)* Schl., Rev. Noctuae 1873, 23 (ex China, Japan, Celebes, Sula, Sangi, Ternate).

f. **Athene florensis** *(1)* Wall., P. Z. S. 1863, 488; id., Ibis 1868, 23.

g. **Ninox japonica** Sharpe, Ibis 1875, 258; *(1)* David & Oust., Ois. Chine 1877, 36; *(2)* Blakis. & Pryer, Ibis 1878, 246; *(3)* Taczan., J. f. O. 1881, 179; *(3bis)* Gurney, P. Z. S. 1878, 940; *(4)* Stejneger, Pr. U. S. Nat. Mus. 1887, 401; *(5)* Everett, J. Str. Br. R. A. S. 1889, 179; *(6)* Bourns & Worces., B. Menage Exped. 1894, 33; *(7)* Grant, Ibis 1896, 111, 463, 531.

h. **Ninox scutulata** *(1)* Sharpe, Cat. B. 1875, II, 156—167 partim; *(2)* id. (nec Raffl.?), Ibis 1877, 4; *(3)* Salvad., Orn. Pap. 1880, I, 80, and Agg. 1889, 23; *(3bis)* W. Blas., Verh. z.-b. Ges. Wien 1883, 22; *(4)* Meyer, Isis 1884, 14; *(5)* Pleske, Bull. Ac. Petersb. 1884, 114; *(6)* Hartert, J. f. O. 1889, 373(?); *(7)* Whitehead, Ibis 1890, 44; *(8)* Seebohm, B. Japan Emp. 1890, 187; *(9)* Styan, Ibis 1891, 326, 486; *(10)* De La Touche, Ibis 1892, 482; *(11)* Seebohm, Ibis 1893, 52; *(12)* Büttik., Zool. Erg. Weber's Reise in Ost-Ind. 1893, III, 272; *(13)* Hartert, Nov. Zool. 1895, 476.

i. **Ninox macroptera** *(1)* W. Blas., Ornis 1888, 545—555; *(2)* id., J. f. O. 1890, 145.

j. **Ninox lugubris** *(1)* Tweedd., P. Z. S. 1878, 940; Gurney, Ibis 1884, 170; *(2)* Steere (nec Tickell), List. Coll. B. Philip. Is. 1890, 8.

k. **Ninox hirsuta japonica** *(1)* Tacz., Faun. Orn. Sib. Orient. 1881, I, 131.

l. **Ninox scutulata japonica** *(1)* M. & Wg., J. f. O. 1894, 239; *(2)* iid., Abh. Mus. Dresd. 1895, Nr. 8, p. 5; *(3)* iid., ib. Nr. 9, p. 2; *(4)* Hartert, Nov. Zool. 1896, 177.

m. **? Ninox scutulata lugubris** *(1)* Eagle Clarke, Ibis 1895, 476.

"Mamejo", Talaut Islands, Nat. Coll.

"Mawututu", Tagulandang Id., iid.

Figures and descriptions. Temm. & Schl. *a I*; Schlegel *d 1*; David & Oust. *g 1*; Stejneger *g 4*; Meyer *h 4*; W. Blas. *i 1*; Sharpe *h 1* pt.

Adult. Above Vandyke-brown, washed on the head with greyish, and with rufous on the back, sides of neck, throat and wings; wing-coverts unspotted, the outer ones dark purplish brown, the inner ones like back, scapulars with concealed white spots; outer

web of primaries light cinnamon-rufous with two or three partially obliterated yellowish bars; tail reddish brown crossed with five dusky bars and terminally margined with buff; under parts white with long oval light chestnut-brown spots; under side of wing banded on the inner webs of the feathers with yellowish isabelline, except on the free ends of the primaries.

"Iris golden yellow; bill dark lead-grey; feet light yellow" (Platen *i 1*).

Some examples have the head greyer than others, and in the former the chestnut stripes on the under surface seem to be a little broader. A greater difference is seen in the tail. Two before us from Celebes and two from Talaut, generally greyer and more broadly striped below, have the tail greyer brown above, crossed with three exposed black bands and two bands concealed by the upper tail-coverts. Two from Talaut, one from Sangi and one from Tagulandang are (in two or three cases) less grey above and less broadly striped, displaying more white below; these have the tail more rufous brown, crossed with four exposed black bands narrower than in the other birds, with three or two concealed under the upper tail-coverts. Two of the greyer birds with three exposed bands in the Sarasin Collection are females, but we are inclined to regard the difference as one of age rather than of sex, the greyer birds being probably older. See, also, on sexual differences: W. Blasius *(i 3)*.

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (8257) imm.? Great Sangi (Meyer)	235	132	—	16
b. (C 13056) imm.? Talaut Is. Nov. 93 (Nat. Coll.) . .	226	120	—	17
c. (C 13055) ad. Talaut Is. Oct. 93 (Nat. Coll.) . . .	224	120	27	15
d. (C 13755) ad. Talaut Is. Nov. 94 (Nat. Coll.) . . .	228	120	—	15
e. (C 15258) imm.? Talaut Is. Oct. 95 (Nat. Coll.) . .	233	127	29	17
f. (C 13455) imm.? Tagulandang, Aug. 94 (Nat. Coll.) .	230	136	—	17
g. (Sarasin Coll.) ♀ ad. Rurukan, N. Cel. 9. XI. 94 .	225	115	25	13
h. (Sarasin Coll.) ♀ ad. Kema. N. Cel. 24. X. 93 . .	218	118	25	14.5

Viewed as a species composed of the above four races *N. scutulata* ranges from the Himalayas, the Amoor River and Japan (except, perhaps, Jesso — *h 8*) southwards throughout India and China to Ceylon, the Andaman and Nicobar Islands, Flores, Celebes, Ternate.

This species varies considerably, and naturalists — starting with the assumption that it is non-migratory — have conferred specific names on specimens killed in a dozen different parts of its range. The result of Dr. Sharpe's valuable, but, from the nature of the difficulties, by no means conclusive, researches *(h 1)* was that there are only three forms of this bird — two light and one dark. Mr. Blanford, as shown above, finds a fourth race in the Andamans. Mr. Hume has recorded the light race of the Andamans from Cachar east of the Brahmapootra, and it seems open to inquiry whether the Andamans are not visited in winter by migrant individuals from India, as well as having a stationary race of their own.

A single specimen of *N. scutulata lugubris*, the type of *N. madagascariensis* Bp., is said to have been obtained in Madagascar. Dr. Sharpe expressed the

opinion that the locality was erroneously indicated; Dr. Hartlaub, in his "Vögeln Madagaskars" 1877, says there can be no question as to the correctness of the locality; Mr. Grandidier, however, takes an opposite view and considers it certainly wrong (Ois. Madag. 1879, I, 126, note). Although we incline to the latter opinion, it need, nevertheless, create no great surprise that a lost straggler, migrating southwards from the Himalayas in winter during the N. E. monsoon, should be aided by it across the Indian Ocean to Madagascar; just as individuals of migrant North American birds occasionally lose their way and succeed in reaching the coast of England.

There remains the dark form of Dr. Sharpe, which, following Schlegel *(d 1)* and Prof. W. Blasius *(i 1)*, we have split into two differing notably in the formula of the primaries (see *supra*), a larger Eastern or Japano-Chinese race and a smaller Western or Indian one. Whether these divisions will prove sufficient, or not, can only be ascertained by means of prolonged investigation and a much more complete series of specimens and facts than the Dresden Museum and the various ornithological periodicals and works up to the present afford; the Eastern race, *N. s. japonica*, may, however, be shown on good grounds to be migratory; while the Western one may be a migratory, or a stationary bird, or the number of stationary birds, slightly differing from all others (f. i. *N. borneensis* [Bp.] Sharpe, Ibis 1889, 80), are perhaps increased at a certain season of the year by migratory ones. The correct answer to these difficulties is not likely to influence Celebes, which is visited by *N. s. japonica*, judging by the length of the wing; but it is to be hoped that some careful ornithologist will see fit to take the matter in hand.

The remarkable denticulate toes of this species and its claws as sharp as pins are suggestive of a class of food preyed upon that is difficult to hold. Colonel Legge says that it feeds almost exclusively on beetles, moths and grasshoppers. It captures insects on the wing (B. Ceylon, 148). The stomach of a specimen killed in Borneo by Mr. Everett was "distended with beetles, chiefly *Buprestidae*", another had swallowed a small gecko-lizard *(h 2)*. The Drs. Sarasin found in the stomach of one killed in N. Celebes 9 recognisable mole-crickets, several cockroaches. With the disappearance of this food at the approach of winter in Amoor Land, China and Japan, the Owls in these regions must of necessity migrate southwards; and, judging from analogies in other parts of the world, it is probable that the birds from the Amoor, in which Prof. W. Blasius and Mr. Taczanowski point out some differences *(i 1, g 3)*, do not proceed so far south as the more southern ones of China and Japan. In Japan it has not yet been recorded with certainty from the northernmost island at all, but Seebohm states that it is "not uncommon in summer" near Yokohama and Nagasaki. It is just at this season that it appears to be entirely absent in the East Indian Archipelago, where, with the exception of the Philippines, we have only been able to find a single specimen dated between the end of April and the end of September. On the other hand all the dates recorded of speci-

mens killed south of the Philippines — over two dozen in number — are in our winter months. As these specimens may be rather important we give a list of them.

Locality	Date	Reference
1. Borneo	April 9. 1896	Sharpe *c 4*
2. Talaut	Nov. 1893	Dresden Mus. (supra)
3. Talaut	Oct. 1893	Dresden Mus. (supra)
4,5. Talaut (2 sp.)	Nov. 1894	Dresden & Tring Mus.
6. Talaut	Oct. 1885	Dresden Mus.
7. Sangi	Oct. 30. 1864	Schlegel *e 1*
8. Sangi	Nov. 23. 1865	Schlegel *e 1*
9. Sangi	Dec. 5. 1865	Schlegel *e 1*
10. Sangi	Jan. 17. 1866	Schlegel *e 1*
11. Sangi	Dec. 11. 1886	W. Blasius *i 1*
12. Sangi	Jan. 20. 1887	W. Blasius *i 1*
13. Sangi	Febr. 1. 1887	W. Blasius *i 1*
14. Sangi	Febr. 3. 1887	W. Blasius *i 1*
15. Sangi	Dec. 18. 1886	W. Blasius *i 1*
16. Siao	Oct. 26. 1865	Schlegel *e 1*
17. Tagulandang (south of Sangi)	Aug. 1894	Dresd. Mus.
18. 19. N. Celebes (2 specimens)	Sept. 24. 1863	Schlegel *e 1*
20. N. Celebes	Spring 1871	Meyer
21. N. Celebes	Oct. 24. 1893	P. & F. Sarasin
22. N. Celebes	Nov. 9. 1894	P. & F. Sarasin
23. S. Celebes	Winter 1888—89	Weber *h 12*
24. Sula Mangoli	Nov. 30. 1864	Schlegel *e 1*
25. Ternate	Nov. 16. 1879	Pleske *h 5.*

The following relate to the western race (the typical *N. scutulata*, or *borneensis*):

Borneo (3 specimens)	Oct. 1885	Sharpe *c 4*
Borneo	March 1886	Sharpe *c 4*
Borneo	March 1875	Sharpe *h 2*
Borneo (2 specimens)	Oct. 1881	W. Blasius *h 3bis*
Borneo	Jan. 25. 1891	Salv.(A.M.C.G. 1891, 42).

Except that Mr. Whitehead — to whom ornithologists are indebted for many useful observations on migration in Borneo — marks *N. scutulata* as a migratory visitor to Palawan *(h 7)*, in addition to supplying dates pointing to the same condition in Borneo, where Dr. Sharpe had already expressed the opinion that it was a migratory bird (P. Z. S. 1879, 325), there appears to exist no statement based on direct observations of the migration of this species in the East Indian Archipelago, where observations on migration have been as yet generally neglected by all travelling naturalists. In China and Japan this is happily not so much the case: Mr. Campbell speaks of it as a summer visitor to Corea *(c 5)*; Mr. Styan as a breeding summer visitant to the Lower Yangtse Basin *(h 9)*; Mr. De La Touche as a species "not uncommon in May" at Foochow, and "rather common at Swatow in April", *(h 10)*, thus, presumably, for the mos

part a passing migrant in South China; in Japan, as Seebohm says, it is rather common in summer. At this time of year as stated above, we have been able to find hardly any record of its having been killed in the East Indian Archipelago (except in the Philippines); like *Butastur indicus* and *Tachyspizias soloensis* it now breeds in China and Japan; only to appear again, like those species, in the Archipelago at the approach of the northern winter.

From the circumstances of this migration and the correspondence of our Sangi and Talaut birds with Prof. W. Blasius' Sangi examples we cannot admit the right to specific or subspecific rank of *N. macroptera*, which is named as doubtfully entitled to it in his important article on this species *(i 1)*.

In N. Celebes and Sangi it appears to be only a visitor, at least the above dates do not permit of any other interpretation than that it breeds from Corea and Japan to Central China in our summer, passes as a migrant through Southern China in spring and autumn and sojourns in N. Borneo, Celebes, Sangi, Sula, Ternate, and perhaps elsewhere during our winter. On the more northerly Philippines a few may even remain to breed, or these are individuals, left behind during the seasonal wandering to the customary breeding grounds of the species.

GENUS CEPHALOPTYNX Kaup.

This genus differs from *Ninox* in having the nostrils placed in two pyriform sack-like swellings of the cere, situated much more basally on the bill (the distance from the nasofrontal suture to the anterior edge of the nostrils being about $^1/_3$ the length of the entire bill from the nasofrontal suture to tip, whereas in *Ninox* it is approximately $^1/_2$ this length), nostrils hidden by bristle-feathers; culmen round, not compressed; wing somewhat short, secondaries extending about $^5/_6$ of the length; tail short and weak, less than 3 times the length of the tarsus; tarsus entirely feathered, toes shorter and stouter, and claws larger than in *Ninox*, the soles less rugose and not fenced laterally with bristles. One species in Celebes and one in the Solomon Islands.

†* 32. CEPHALOPTYNX PUNCTULATA (Q. G.).

Spotted Hawk-owl.

a. **Noctua punctulata** *(1)* Quoy & Gaim., Voy. Astr. Zool. 1830, I, 165, Atl. pl. 1, f. 1; *(2)* Schl., Mus. P.-B. Striges 1862, 29; *(3)* id. Rev. Noctuae 1873, 29.

b. **Athene punctulata** Gray, Gen. B. 1845, I, 45; *(1)* Wall., Ibis 1868, 22; Wald., Tr. Z. S. 1872, VIII, 38; Brüggem., Abh. Ver. Bremen 1876, V, 47; Meyer, Ibis 1879, 57; W. Blas., J. f. O. 1883, 135.

Cephaloptynx punctulata *(1)* Kaup, Tr. Z. S. IV, 209; *(II)* Meyer, Abb. Vogelskel. 1897, pl. CCXII.

c. **Spiloglaux punctulata** Bp., Rev. Zool. 1854, 544.

d. **Ninox punctulata** *(1)* Sharpe, Ibis 1875, 259; *(2)* id., Cat. B. 1875, II, 182; *(3)* Sclater, P. Z. S. 1877, 108; *(4)* Salvad., Orn. Pap. 1880, I, 87; *(5)* Meyer, Ibis 1882, 234; *(6)* Guillem., P. Z. S. 1885, 546; *(7)* Sharpe, P. Z. S. 1888, 184; Lister, t. c. 527; *(8)* Salvad., Orn. Pap., Agg. 1889, I, 24; *(9)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 4; *(10)* Hartert, Nov. Zool. 1896, 161; *(11)* id., ib. 1897.

For further references see Sharpe *d 2.*

"Totosik", Manado (Nat. Coll.).

Figures and descriptions. Quoy & Gaimard *a I*; Schlegel *a 2*; Sharpe *d 2.*

Adult. Above Prout's brown, with a reddish tinge in it, sprinkled all over with minute light spots, which take the form of short bars on either web of the tail-feathers and on the outer webs of the quills; above the eyes from forehead to ear-coverts a stripe of white; a broad band of white extending from below the ear-coverts on the sides of neck, on throat and chin; chest brown like the back and spotted or barred with whitish; remaining under surface more rufous marked with broken bars and spots of whitish; thighs, under tail-coverts, under wing-coverts and some barring at the base of the quills light buffy (Gorontalo — Nrs. 2203, 2204). "Iris brown" (Guillem. *d 6*).

Other specimens from the Minahassa are apparently older adults and differ from the two above described from Gorontalo in having the upper surface darker and without the reddish tinge, the spots fewer and much less conspicuous; the abdomen and the middle part of the body below white, like that described by Dr. Sharpe. "Iris brown; bill pale yellow-grey; feet yellowish" (P. & F. Sarasin).

Young. Differs from the adult in being dark brown below; obscurely spotted with whitish: thighs brown, indistinctly barred, hinder side and crissum buff; throat dark brown, submalar region and chin whitish; upper surface dark chocolate-brown, unspotted on mantle and back, spotted as in the adult on the wing-coverts, remiges, rectrices, and occiput; rest of head almost unspotted: "iris dark sepia" (♂ juv. Tomohon, N. Cel. 26. IV. 94: P. & F. Sarasin).

Measurements.

	Wing	Tail	Tarsus	Culmen from cere
a. (2204) ad. Gorontalo 1871 (Meyer)	160	75	32	18
b. (2203) ad. Gorontalo 1871 (Meyer)	155	68	33	—
c. (C 10793) vix ad. Tondano, VIII—IX. 92 (Nat. Coll).	170	76	—	20
d. (C 10792) ad. Tondano, VIII—IX. 92 (Nat. Coll.) .	173	77	—	18
e. (C 10851) ad. Manado, VIII—IX. 92 (Nat. Coll.) . .	170	77	33	—
f. (Sarasin Coll.) ♂ ad. Tomohon, 26. III. 94 (P. & F. S.)	157	76	—	18.5
g. (Sarasin Coll.) ♀ ad. Kema, 13. IX. 93 (P. & F. S.)	165	77	—	19
h. (Sarasin Coll.) ♀ ad. Tomohon (P. & F. S.) . . .	157	72	—	—
i. (Sarasin Coll.) ♀ ad. Tomohon, 16. IV. 94 (P. & F. S.)	166	75	—	18
j. (Sarasin Coll.) ♀ ad. Tomohon, 28. III. 94 (P. & F. S.)	167	—	—	17.5
k. (Sarasin Coll.) ♂ juv. nr. Tomohon, 26. IV. 94 (P. & F. S.)	165	71	—	17

Distribution. Celebes: South Peninsula, Macassar (Wallace *b 1*, Everett *d 10*), Indrulaman (Everett *d 10*); foot of Mt. Bonthain (Doherty *d 11*); N. Peninsula, Minahassa (Forsten *a 2*, v. Duivenbode *a 3*, *etc.*); Gorontalo (Meyer).

This species — peculiar, so far as is yet known, to the Island of Celebes — has a near ally in *Ninox (Cephaloptynx) granti* Sharpe of Guadalcanar in the Solomon Islands, which has the mantle unspotted, the under surface much more distinctly barred, and the fore part of the thighs brown, by which means, as Dr. R. B. Sharpe points out, it may be distinguished from the Celebesian species *(6, 7)*. Another species probably closely allied is the *Ninox odiosa* Sclat. of New Britain, which differs, according to Sclater and Salvadori, from *C. punctulata* in being considerably larger, in having the brown of the upper surface paler and duller and the spots much larger, and in its wanting the line of white or fulvous down the middle of the under surface *(3, 4)*. A young specimen in down in the Dresden Mus. (Nr. 13051) shows the same distinguishing characters, besides it has the whole under surface broadly barred. Although the genus *Ninox* is found from India and Japan throughout the intervening countries as far as Australia and New Zealand, and also in Madagascar, it contains many aberrant forms, one of which is the Celebesian *N. punctulata*, which served as type for Kaup's genus *Cephaloptynx* and now finds its nearest allies in New Britain and the Solomon Islands. It is quite possible that other nearly related species may yet be found in the intervening countries as well as in the great islands to the west of Celebes, but in any case the occurrence of an Owl in an out-of-the-way part of the world has no real zoo-geographical worth. Owls, in consequence of their nocturnal habits, of their thick, fluffy plumage and lightness of weight, buoyant flight, and their powerlessness to bear up against a strong head-wind, are more liable than most species to distribution by wind and storms. This may explain the occurrence of *Strix flammea* and of *Otus brachyotus* on certain remote islands of the Pacific, as well as their being distributed over the greater part of the world besides.

Nothing is known of the food or nidification of *C. punctulata*.

Attention may be drawn to the resemblance of the plumage of this species to certain neotropical members of the genus *Glaucidium* — especially *Glaucidium jardini* Bp. of New Granada — but which is much smaller.

GENUS SCOPS Sav.

The Scops Owls are of small size, furnished with small "ear"-tufts; bill rather weak, cere long (about $^2/_5$ the entire length of the bill), laterally swollen to enclose the nostrils; tarsus feathered; toes generally naked (sometimes feathered above), not bristly; wings rather long; tail moderate, rounded; plumage highly variegated and vermiculated. Feeds on insects and small mammals. Eggs 4—6. Some 25 species, inhabiting the tropical and temperate parts of all the continents, but absent in Australia.

33. SCOPS MANADENSIS (Q. G.).

Manado Scops Owl.

The little Eared Owl of Celebes, the *typical S. manadensis*[1]), as the first described of a number of local races not worthy of separation as distinct species, should combine under its specific title, *S. manadensis* itself and some eight other subspecies known up to the present as occurring in Celebes, Sangi, the Moluccas, Borneo, Sooloo, Flores and Madagascar.

1. The typical Scops manadensis.

a. **Strix manadensis** *(I)* Quoy & Gaim., Voy. Astrol. Ois. 1830, I, 170, Atl. pl. 2, f. 2.
b. **Otus manadensis** *(1)* Temm. & Schl., Faun. Jap. Aves 1845, 26.
c. **Ephialtes menadensis** *(1)* Gray, Gen. B. 1845, I, 38; *(2)* Wall., Ibis 1868, 25 pt. (Celebes only); *(3)* Wald., Tr. Z. S. 1872, VIII, 40 pt.; *(4)* Meyer, Ibis 1879, 57; *(5)* W. Blas., J. f. O. 1883, 135.
d. **Pisorhina menadensis** *(1)* Kaup, Isis 1848, 769.
e. **Scops menadensis** *(1)* Bp., Consp. 1850, I, 47; *(2)* Schl., Mus. P.-B. Oti 1862, 20; *(3)* id., Rev. Noctuae 1873, 12; *(IV)* Sharpe, Cat. B. 1875, II, 76, pl. VIII, fig. 2; *(5)* Brüggem., Abh. Ver. Bremen 1876, V, 48; *(6)* Salvad., Ann. Mus. Civ. Gen. 1876, 644; *(7)* Hartl., Vög. Madag. 1877, 46; *(8)* Meyer, Isis 1884, 13; *(9)* Guillem., P. Z. S. 1885, 545; *(10)* W. Blas., Ornis 1888, 544; *(XI)* Meyer, Abb. Vogelskelet. 1892, pl. CLXI, pt. XVI, 31; *(12)* M. & Wg., Abh. Mus. Dresd. 1895 Nr. 8, p. 5; *(13)* iid., ib. 1896 Nr. 1, p. 7.
f. **Megascops menadensis.** Kaup, Tr. Z. S. IV, 230.
g. (?) **Scops siaoensis** *(1)* Schl., Rev. Noctuae 1873, 13.
"Hot Hot", Manado, N. Celebes, Nat. Coll.
For further references see Sharpe *e IV.*
Figures and descriptions. Quoy & Gaimard *a I*; Sharpe *e IV*; Meyer *e 8*, *e XI* (skeleton); Schlegel *e 3*, *g 1*; Brüggemann *e 5*; W. Blasius *e 10.*
Adult. General colour above, of head, neck, back and wing-coverts, mummy brown, passing into a pale dull or drab-brown on quills, upper tail-coverts and tail, the whole thickly and minutely variegated with spots of tawny olive or rufous and with black, most strongly expressed as streaks about the shafts and broken up into unformed cross-bars and fine vermiculations on the webs of the feathers; the exposed outer webs of the scapulars white or buffy white tipped with black; superciliary region whitish; breast cinnamon variegated with white and with black vermiculations and central streaks; sides, abdomen and under tail-coverts like the breast, but much more mottled with unformed bars and spots of white; tarsi — feathered to near the toes — wood-brown speckled with black; primaries marked on the outer webs with pale cinnamon bars of about 4 mm wide and separated by intervals about twice as broad of brownish (N. Celebes and Sangi, Nr. 8253, 8254, etc.).
Variation. As in some other forms of *Scops* Owl, browner and more rufous individuals of this race occur, the latter looking like the former saturated in a rufous dye. A fine series of thirteen in the Sarasin Collection shows that this difference is not due to

[1]) This word has been variously spelt *manadensis*, *menadensis*, *minadensis*, but, not only is *manadensis* the original spelling of Quoy & Gaimard, but also the correct orthography of the town, Manado.

sex, nor to locality, also that it is not to be ascribed to dimorphism, since the series shows transitions from greyer, dull brown birds to strong rufous. Young and nestling specimens — of which there are four in the Sarasin Collection and one in the Dresden Museum — are all of the grey-brown type, and it is therefore extremely probable that the intense rufous colour is simply a sign of old age.

Young. A young one clothed in nestling down, except for the wings, tail and some feathers of the breast, has the bars on the outer webs of the quills white; the upper plumage more broccoli brown and less rufous, than in the adult; the feathers on the breast show that this part is more strongly mottled with white and that the under side is altogether lighter than in old birds. In this it resembles a young one of *S. magicus* from Ceram and another of *S. leucospila* from Halmahera — the latter marked ♂ — in the Dresden Museum, which look as though they might have been haunting a flour-mill, and bear about the same degree of resemblance to their dark rufous parents that a miller does to his fellow men. Wing 152 mm (Nr. 7755 Manado).

A young one in down is whitish brown above and below, barred with dusky brown (♂, Tomohon, 13. VI. 94, P. & F. S.).

Two, a little older, are assuming the mature-looking variegated brown plumage on the upper parts; the under surface is whitish, somewhat sparingly marked with irregular dusky bars (♂, ♀, Macassar, 15. IX. 95, P. & F. S.).

Measurements (15 specimens not including young ones). Wing 144—157, average about 150 mm; tail c. 80; tarsus c. 25—28; bill from nostril c. 10.5—12 (N. & S. Celebes and Gt. Sangi — Mus. Dresden and Sarasin Coll.).

Skeleton.	*S. manadensis*	*S. rutilus* (Madagascar)
Greatest breadth of cranium .	31.0 mm	34.0 mm
Length of humerus	44.5 »	51 »
Length of ulna	47.5 »	57 »
Length of metacarpus. . . .	24.5 »	25 »
Length of principal digit . .	16.8 »	19 »
Length of femur	32 »	35 »
Length of tibia	46.5 »	54 »
Length of tarso-metatarsus . .	25.0 »	30 »
Greatest breadth of sternum .	17.5 »	21 »
Height of crista sterni . . .	5.2 »	8 »
Length of coracoid	20.5 »	22 »

(ex Meyer *e XI* and Milne-Edw. & Grandid., Hist. Nat. Madag. 1876, XIII, pl. 40A, and texte 1879, XII, 134.)

Distribution. Celebes: — Minahassa (Q. & G. *a I*, Forsten *e 2*, Meyer *c 4*, etc.); Macassar (Wallace *c 2*, *e IV*, P. & F. Sarasin); Kandari, S. E. Peninsula (Beccari *e 6*); — Siao (v. Duivenbode *e 3*); Great Sangi (Meyer *e 8*, Platen *e 10*).

The specimen from Siao in the Leyden Museum, the only one as yet known from that island, is smaller than any specimen as yet recorded from Celebes and Sangi, viz: wing 126 (4 in. 9 lines French), measured straight with compasses, Schlegel's usual method, as against 144 mm (measured over the wing) of the smallest specimen in the Dresden Museum, being 18 mm smaller. *S. manadensis*, however, varies in size and it occurs in Great Sangi, between which island and Celebes Siao lies, so that it is rather more probable than not, that the type of *S. siaoensis* comes within the limits of variation of size characteristic to the species. A greater amount of variation in size is shown amongst specimens of *S. leucospila* of Batchian and Halmahera, the wing of the type (Batchian) measures (159 mm) those of three specimens from Halmahera in the Dresden Museum measure 192 mm, 191 and 179 (young).

2. Scops manadensis albiventris (Sharpe).

h. **Scops manadensis** Wall. & Wald. *c 2*, *c 3*, pt.

i. **Scops albiventris** *(1)* Sharpe, Cat. B. 1875, II, 78, pl. VIII, fig. 1.

Diagnosis. Differs from the *typical S. manadensis* in having a distinct wash of grey on the upper surface; cheeks greyish white; belly white with very scanty cross markings and lines (Sharpe ib.).[1])

Distribution. Flores (Wallace).

3. Scops manadensis rutilus (Pucher.).

j. **Scops rutilus** *(1)* Pucher., Rev. Zool. 1849, 29; *(2)* Sharpe, Cat. B. 1875, II, 80; *(3)* Hartl., Vög. Madag. 1877, 44.

k. **Scops manadensis** Hartl. (nec Q. & G.), Faun. Madag. 23; Grandid., Rev. Zool. 1867, 255, 321; Milne-Edw. et Grandid., H. N. Ois. Madag. 1876, pl. XL, XLA (skelet.), texte 1879, 133.

l. **Scops madagascariensis** Grandid., Rev. Zool. 1867, 85.

For further synonymy and references see Sharpe *j 2*; Hartl. *j 3*.

Diagnosis. Differs from the *typical S. manadensis* in having the inner lining of the quills nearly uniform, with only a few broad bars of yellowish white near the base of the feathers; whereas in the *typical S. manadensis* the whole wing is narrowly barred with fulvous for its whole extent; upper surface of the latter more stellated, the spots being more yellowish in appearance (Sharpe *e IV*).

Observation. We do not think that Dr. Sharpe's diagnosis will be found to answer for all cases; the under side of the remiges displays much variation, it is the paler (in our opinion younger) birds in which the wing below is most markedly barred; one or two of the rufous specimens have no bars thereon at all except at the base, and there is a freckled appearance towards the tip. For some osteological differences see Meyer under *e XI*, and table *supra* p. 104.

Distribution. Madagascar.

4. Scops manadensis capnodes (Gurney).

Scops capnodes J. H. Gurney, of Anjouan Island in the Comoro Group has been recently separated as a species from *S. rutilus* of Madagascar (Ibis 1889, 104). Plumage much darker, also less mingled with white, the pale portion of the scapulars (white in six, light rufous in a seventh Madagascar specimen, compared) much less extended, absent in one specimen; wing a little longer; lower portion of tarsus bare.

Observation. The remaining three races of *S. manadensis* may be usually distinguished from the foregoing by their larger size: Wing 165—195 as against 130—165 mm, but individuals sometimes overstep these limits.

5. Scops manadensis magicus (S. Müll.).

m. **Strix magica** S. Müll., Verh. Nat. Geschied. Natuurk. Comm. 1839—44, 110 (Amboina).

n. **Otus magicus** *(1)* Temm. & Schl., Faun. Jap. Aves 1845, 25 (Amboina, Celebes).

o. **Scops magicus** *(1)* Bp., Consp. 1850, I, 46; *(2)* Schl., Mus. P.-B. Oti 1862, 22; *(III)* Sharpe, Cat. B. 1875, II, 70, pl. V; *(4)* Brüggem., Abh. Ver. Bremen 1876, V, 47; *(5)* Salvad., Orn. Pap. 1880, I, 73, 76; Agg. 1889, I, 22.

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[1]) Can this be a young individual?

p. **Ephialtes leucospila** *(1)* Wall., Ibis 1868, 25, 27 partim (Celebes).
For synonymy see Salvad., ib.
Diagnosis. General plumage of a yellow tint, both above and below; ruff and ear-coverts ochraceous buff; no white, but yellowish, on the scapulars; no perceptible collar round hind neck; entire upper surface very strongly banded with fulvous (Sharpe *m I*).
Observation. According to Salvadori's key, specimens, agreeing with the following two subspecies in having the upper surface darker than the lower, occur, but such may be distinguished from these other subspecies by the markings of the under surface being scantier, but broader.
Distribution. Amboina; Ceram *(m 2)*.
Observation. There are two specimens of a *Scops* in the Leyden Museum, mentioned by Schlegel as having the "teinte générale d'un roux foncé très ardent", which are stated to have been obtained at Gorontalo by Forsten: a third in the Darmstadt Museum, also from Celebes, was collected by Dr. Riedel probably at Gorontalo likewise. Both Schlegel and Brüggemann agree in separating these from *S. manadensis*, and in recording two forms of *Scops* Owl from Celebes. Dr. Sharpe only allows the island one race, and that the typical *S. manadensis*. Brüggemann found his Celebesian *S. magicus* perfectly identical with a Halmahera specimen; Schlegel his two with one from Ternate. On the other hand we now consider these rufous birds from Celebes to be simply old examples of the local race (see *supra*).

6. Scops manadensis leucospilus (Gray).

q. **Scops leucospilus** (Gray), *(1)* Sharpe, Cat. B. 1875, II, 72, pl. VI; *(2)* Salvad., Orn. Pap. 1880, I, 72, 74; *(3)* Pleske, Bull. Ac. Petersb. 1884, 522.
r. **Scops bouruensis** *(1)* Sharpe, Cat. B. 1875, II, 73, pl. VII, f. 2 (fide Salvad.).
Diagnosis. Differs from *S. m. magicus* in having the markings of the under surface more finely diffused and numerous; and from *S. m. morotensis* in being paler and having the scapulars spotted with white, not rufescent white (Salvad. ib.).
Distribution. Batchian, Halmahera; Ternate; Buru *(q 2, q 3)*.

7. (?) Scops manadensis morotensis (Sharpe).

s. **Scops morotensis** *(1)* Sharpe, Cat. B. 1875, II, 75, pl. VII, f. 1; *(2)* Salvad., O. Pap. I, 72, 76; Agg. 1889, I, 22.
Diagnosis. Like *S. m. leucospilus*, but darker; the spots on scapulars rufescent white (Salvad. ib.).
Distribution. Morty; Ternate *(s 2)*.
Observation. Mr. Pleske considers on good grounds that this form is identical with *leucospilus*. Although it is not advisable to unite them until more material from Morty Island is forthcoming, it appears to us very probable that what is called *morotensis* are only old specimens of *leucospilus*. As three specimens in the Dresden Museum of the *typical manadensis*, *magicus* and *leucospilus* with more or less remains of nestling down show, as does also a specimen figured by Dr. Sharpe (pl. VI), the young of these owls have a remarkably pale, blanched, appearance; hence and from specimens before us we conclude that the more saturated, rufous, coloration is a sign of greater age. Of the four specimens of *morotensis* in the British Museum the three labelled "Molucca Islands" may, of course, have come from Morty, or from one of the neighbouring islands, which have furnished *leucospilus*. Three specimens of the

latter in the Dresden Museum from Halmahera afford interesting gradations of plumage; the first (♂ juv.) is one of the blanched birds above mentioned with remains of nestling down, the second (♂) is a normal *leucospilus* with white on the scapulars, the third — marked ♀ — is altogether darker and more rufous and has the outside of the scapulars marked with pale rufous as in the normal *morotensis*! The second stands midway between this and the first.

8. Scops manadensis brookii (Sharpe).

t. **Scops brookii** *(1)* Sharpe, Bull. Brit. Orn. Club Nr. II, 1892, p. IV; id., Ibis 1893, 117; *(II)* Hose, t. c. 417, pl. XI.

Diagnosis. "Differs from *S. bouruensis* and all its allies in having the triple band on the head and hind neck white instead of ochraceous, the pattern being the usual one of the group, viz., a white occipital spot; a second, larger one, on the nape; and a third on the hind neck forming a broad cervical collar (Hose *t III*). The broad band on the side of the crown, extending to the ear-tufts, is also white. The tibial joint has a large patch of chestnut barred with black".

Distribution. Borneo.

9. Scops manadensis sibutuensis (Sharpe).

u. **Scops sibutuensis** *(1)* Sharpe, Ibis 1894, 244.

Diagnosis. Differs from *S. manadensis* "in having all the markings of the upper surface very fine and not all over as in that species. The quills have also more bars in the Celebesian bird than in the species from Sibutu".

Distribution. Sibutu, Sooloo Islands.

Observation. Both the characters indicated by Dr. Sharpe as discriminative for this form are subject to great variation in the *typical S. manadensis*.

To these subspecies should perhaps be added *S. mantananensis* Sharpe of Borneo (Ibis 1893, 117, 559; 1894, 244).

The little Eared Owl, *S. manadensis*, presents a case of the faunistic relationship of Celebes and the surrounding islands with Madagascar. For a long time *S. rutilus* Pucher. of that island was regarded as identical with *S. manadensis* of Celebes and Flores as has been already pointed out, and we do not believe that it is always possible to distinguish them, though Dr. Sharpe considers them distinguishable by means of the different aspect of the inner lining of the quills. In six specimens in the Dresden Museum the number of spots on the outer web of the first primary ranges between six and eight. The Flores bird *S. albiventris* Sharpe, is also separated from the typical Celebes form of *S. manadensis*; but one before us does not answer to Dr. Sharpe's diagnosis except that the belly is whiter than in almost any from Celebes. The breast of this example is more tawny brown and less boldly streaked with black.

The *typical Scops manadensis* is highly variable. It would be an error to suppose that the fact that *S. rutilus* is not more than subspecifically distinct from *S. manadensis* lends aid to the theory of a former land-connection between Celebes and Madagascar in bygone ages: such aid must be sought for in allied

genera — not in the almost perfect identity of two species, which points to another cause. *S. rutilus* is possibly a recent immigrant to Madagascar — one that was carried out to sea by a storm at night from anywhere within its range and, somewhat aided by the strong and continous S. E. tradewind, flying, as all birds do, at an angle with the wind (though it must of course travel much quicker) had the good fortune to reach as the nearest land Madagascar. (See for the winds in the Indian Ocean, which very well explain such a case, the Atlas of the Indian Ocean, published by the "Deutsche Seewarte" 1891 pl. 21.) According to Gätke ("Vogelwarte Helgoland" 1891, 72) a bird may even fly a geographical mile in a minute (!?), the distance from Celebes or the small Sunda Islands to Madagascar, therefore, would require between 17 and 18 hours (70 degrees of 15 geographical miles each). As a bird will scarcely be able to remain on the wing for such a time without rest, it could only in exceedingly rare cases reach Madagascar from its eastern quarters, through there are various intermediate islands of small size. There are no other cases known of such a similarity between birds of the East Indian Archipelago and Madagascar. Owls, for reasons already given, appear to be especially liable to distribution in this way.

Nothing is known of the habits of *S. manadensis*. The Madagascar race preys on mice, small birds, lizards and large insects; a similar diet, with the addition of bats, is described by Colonel Legge for *S. minutus* of Ceylon (B. Ceylon, 144).

Scops mantis (T. & Schl.).

This species is noted by v. Rosenberg as occurring in Celebes (Malay. Archip. 1878, 271), but, as Prof. W. Blasius remarks, it is obviously taken from Gray's Hand-List (I, p. 46, Nr. 477) without any special new proof of its presence there (cf. W. Blasius, J. f. O. 1883, 125). Rosenberg has often rendered his statements untrustworthy by a similar proceeding, as is now generally known.

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[1]) As an excellent parallel to the occurrence of *Scops manadensis* in Madagascar may be cited Prof. König's discovery of *Glaucidium siju* Cab. of Cuba in the Canary Islands (J. f. O. 1890, 336—340), a single specimen of which was killed on Adeje, August 22nd, 1889 by Don Ramon Gomez, who informed Prof. König that he met with it after strong winds in the S.W. part of the island at a height of 1074 feet. Prof. König remarks: "Altogether it looks as if African continental forms are entirely absent in the Canaries, while more and more of such from the New World are always being discovered. And does it not seem manifest that this most striking immigration of American types is to be traced to the air-currents which pass from America across the sea? ... The prevailing winds ... which are rarely or hardly ever directed from the African Continent towards the island-group, blow on the other hand (probably indeed with some constancy) from the New World across the great stretches of the Atlantic Ocean and continue as far as the Old."

FAMILY STRIGIDAE.

The sternum is without a manubrium; the furcula formed by the clavicles is perfect, there is only one notch on either side in the hinder margin of the sternum; the ring on the upper part of the tarsus in front is present[1]), but reduced to a cartilaginous loop; the second joint of the middle toe is considerably longer than the basal joint, the claw thereof is pectinated; the facial disk is very perfect, the radiating feathers on either side meeting to form a sort of ridge or "hog-mane" over the forehead and base of the culmen; the disk is surrounded by a well-defined ruff of stiff feathers.

GENUS STRIX L.

Now that *Photodilus* has been removed from the Barn Owl section in virtue of its not having the clavicles united and of its having two processes on the hinder margin of the sternum (cf. Newton, Dict. B. 673), the genus *Strix* is the only one of the *Strigidae* and may be recognised by the characters given for the family. There are five species. The range of the genus is almost cosmopolitan. 3—4 white eggs are laid. The birds prey chiefly upon small mammals.

34. STRIX FLAMMEA L.

Barn Owl.

Although the Barn Owl, *Strix flammea*, and its races have been most ably discussed by Dr. Sharpe in the Catalogue of Birds, II, 291—303 and in Rowley's Ornithological Miscellany, I, 269—298; II, 1—21, it would be hardly possible to divide this cosmopolitan species into subspecies which would answer to all the peculiar conditions of the case. This work must be left to the ornithologist of the future, supposing he fulfil the ideas concerning the necessity of trinomial nomenclature with all its consequences. In Celebes and Sangi *Strix flammea* presents a great differentiation, and it was named as a distinct species by Schlegel after its discoverer, Rosenberg. It is not easy, however, to point to any difference between it and the Javan form of *S. flammea* (*javanica* Gm.); though some, as a rule, are to be found.

+ 1. Strix flammea rosenbergi (Schl.).

a. **Strix flammea** sp. *(1)* S. Müll., Verh. Nat. Comm. 1839—44, 87; *(2)* id., Reizen 1858, II, 8.

b. **Strix rosenbergi** *(1)* Schl., Ned. Tijdschr. Dierk 1866, III, 181; *(2)* Wall., Ibis 1866, 26, 27; *(3)* Wald., Tr. Z. S. 1872, VIII, 41; *(4)* Schl., Rev. Noctuae 1873, 16 (Celebes tantum); *(5)* Wald., Tr. Z. S. 1875, IX, 146; *(6)* Brüggem., Abh. Ver. Bremen 1876, V, 48; *(7)* Schl., Notes Leyd. Mus. 1878, I, 50; *(8)* Rosenb., Malay. Archip. 1878, 271, 583; *(9)* Meyer, Ibis 1879, 57; *(10)* W. Blas., J. f. O. 1883, 135; *(11)* Meyer, Isis 1884, 6, 14; *(12)* Guillem., P. Z. S. 1885, 546; *(13)* W. Blas., Ztschr. ges. Orn. 1885, 235; *(14)* id., Ornis 1888, 556; *(15)* Büttik., Zool. Erg. Weber's Reise Ost-Ind. 1893, III, 272; *(16)* Hartert, Nov. Zool. 1896, 161.

c. **Strix flammea** *(1)* Sharpe, Cat. B. 1875, II, 293; id., Rowl. Orn. Misc. 1866, I, 297; II, 14.

d. **Strix flammea rosenbergi** *(1)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 5.

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[1]) Has been supposed to be absent (Newton, Dict. B. 1894, 672).

"Ngiong", Minahassa, Nat. Coll.
"Wada-Watonga", N. Celebes, Gorontalo ?, Rosenb. *b 8*.
"Karin", Tjamba, S. Celebes, Platen *b 13*.

Descriptions. Schlegel *b 1*, *b 4*; Sharpe *c 1*; Brüggemann *b 6*; Rosenberg *b 8*; W. Blasius *b 13*, *b 14*.

Adult. Above drab-brown, each feather finely vermiculated with white and having a spot of white in the blackish middle-ground of the end of the feather; shoulders and wing-coverts tawny buff, coarsely vermiculated towards the ends of the feathers with dusky brown and white and tipped with spots of white as on the back; quills and tail-feathers above paler than the back, this colour is gathered into five distinguishable dusky bars on the tail and into several imperfect ones on the quills, the intermediate spaces coarsely speckled and vermiculated with drab-brown, dull tawny and whitish; facial disk greyish white, in front of eyes dark brown; facial frill varied with feathers of raw umber with dark centres, of pure white and of white tipped with dark brown or rufous, the last-named being prevalent under the chin; breast buff, the feathers furnished with a small terminal spot, and some with broken terminal margins, of dusky; the remaining under-parts and under wing-coverts ochraceous buff, each feather marked with one or more small spots of brown (N. Cel. C 10417).

"Iris dark brown; bill whitish; feet greyish yellow" (Platen *5*).

Variation. This Owl varies to a considerable extent. The general tint above of the specimen described is the brownest among a number of specimens, and the bars on the are the least decided. Other specimens are much greyer above, ranging from a tail moderately darker grey to much blacker grey; four exposed bars on the tail and one concealed under the coverts are sharply defined; the white spots are more or less numerous. The ruff round the face is usually varied with white feathers, sometimes tawny with umber brown tips to the feathers; the under parts are darker or paler ochraceous buff, the blackish spots variable in number and size.

Two specimens from Batavia in Java (Nr. 5909 and 2202) have the under surface more barred and the spots on the back more conspicuous. These differences are slight, when seen in the actual specimens, and not sufficient in themselves alone to justify even the subspecific separation of the Celebesian Owl from the Javan one (*Strix javanica* Gm.), but we do not unite them as it remains to be seen what a greater quantity of material will prove.

Measurements.

	Wing	Tail	Tarsus	Bill from cere	Mid. toe without claw
a. (C 10417) — North Celebes	360	150	82	28	50
b. (8266) — North Celebes	340	150	77	28	43
c. (8267) — Great Sangi	336	155	75	26	41
d. (C 10852) — North Celebes	340	150	78	27	—
e. (C 13355) — North Celebes, May 94 (C.)	355	140	—	28	—
f. (C 13864) — North Celebes, Dec. 94 (C.)	345	145	—	26	—
g. (Sarasin Coll.) ♂, Kema, N. Cel., 1. XI. 93	335	153	—	28	—
h. (Sarasin Coll.) ♀, Tomohon, N. Cel., 28. III. 94	348	156	—	29	—
i. (Sarasin Coll.) ♂, Kema, Nov. 93	340	150	—	28	—
j. (Sarasin Coll.) ♂, Tomohon, 31. III. 94	355	150	—	29	—
k. (Sarasin Coll.) ♀, Maros, S. Cel., 22. I. 96	335	150	—	—	—
For comparison: *S. javanica* Gm.					
(5909) — Batavia (v. Schierbrand)	360	160	81	26.5	49
(2202) — Batavia	343	150	73	26.5	—

Distribution. Celebes, Sangi. — Great Sangi (Meyer *b 11*, Platen *b 14*). Celebes, N. Peninsula: Minahassa (v. Duivenbode *b 4*, *b 10*, Meyer *b 9*, etc.); Gorontalo Distr. (v. Rosenberg *b 1*); S. Peninsula: Macassar (S. Müller *a 1*, *a 2*, Wallace *b 2*, Weber *b 15*, Everett *b 16*); Tjamba Distr. (Platen *b 13*), Maros (P. & F. S.); Indrulaman (Everett *b 16*).

Schlegel has identified a young female from the Philippines with *S. rosenbergi*, but the only Barn Owl known from there at present is *Strix candida* Tickell, which is perfectly distinct, and Schlegel's indication therefore requires further investigation.

Prof. Blasius *(b 13)* calls attention to the great difference between this form and the typical *Strix flammea.* "It does not appear to me to be correct to account this form, as Sharpe has done *(c 1)*, simply a variety of *Strix flammea.* The stouter bill, tarsus and toes, the bristly feathering of the lower half of the tarsus, the rusty brownish upper surface of the tail crossed with four bands with vermiculate markings between them, the darker quills without any clear cross-banding, the darker coloration of the plumage in general and the peculiar character of the spots with which it is marked, which are very accurately described by Brüggemann *(b 6)*, — all this gives the bird a thoroughly different character".

Wallace (s. Mal. Arch.) also has called especial attention to the much greater size and strength of this species as compared with *Strix javanica.* We would point out, however, that one of the specimens from Batavia in the Dresden Museum is as large as our biggest Celebesian ones (see p. 110).

The earliest notice of this Barn Owl appears to be one of Sal. Müller, who speaks of a species of Barn Owl as resorting to old temples (!), caves, etc. near Macassar *(a 1, a 2)*. Mr. Wallace obtained it at this place in 1856 in bamboo thickets. In the stomach of one of their specimens the Drs. Sarasin found a Rat. These animals abound in Celebes.

† 2. The typical Strix flammea.

e. **Strix flammea** *(1)* Hartert, Nov. Zool. 1896, 177.

Diagnosis. Size much smaller; bill, tarsus, toes and claws much weaker; remiges light cinnamon-rufous, with about 4 well-defined vermiculate bars of grey and dusky; dusky without grey on the inner webs; upper parts much paler, the white spots smaller and more elongated.

Wing c. 270 mm; tail 115; tarsus 57; middle toe without cl. 30; bill fr. c. 18.

Distribution. Not clearly defined. In the Celebesian Province: Kalao Island between Flores and Celebes (Everett *e 1*).

Quite recently Mr. Hartert has recorded "typical *Strix flammea*" from the area included in this work. It may possibly be a migrant there from the Indian countries, but it is more likely to prove a resident. It is, as shown above, very different from *Strix rosenbergi. S. candida* is about the same size, but has a very long slender tarsus, bare for its lower third, and much longer, stouter toes.

For fuller particulars about *S. flammea*, see Sharpe *(c 1)* and the principal works on European and Indian ornithology.

† * 35. STRIX INEXPECTATA Schl.

Unexpected Owl.

Strix inexpectata Schl., Notes Leyden Mus. I, 1878, 50; J. f. O. 1879, 426; W. Blas., J. f. O. 1883, 124.

Description. Differs as follows from *S. rosenbergi*. Wing short, the point of it overreaching the secondaries by only 45—55 mm (20—24 lines French) as against 95—115 mm in that species; the secondaries crossed with 7, the first primary with 8 and the others with 9 narrower black bars; under surface of the wing darker (silvery grey), the bars indistinct and quite obliterated on the first primary; tail crossed with nine bars; tarsi covered with downy feathers down to the toes, which are somewhat shorter and much more slender than in *S. rosenbergi*; upper parts very bright rufous, unmixed with grey and marked with smaller white spots; below deep tawny rufous as in the darkest specimens of *S. rosenbergi*; face darker, as in *S. castanops* and *S. novaehollandiae* ("light chestnut, the feathers in front of the eye black, the loral plumes also slightly tipped with black" — Sharpe, description of *S. castanops*, Cat. B. II, 305). (Ex Schlegel.)

Measurements. Wing 258 mm; point of wing 45—55; tail 122; tarsus 68; middle toe 36 (converting the French lines of Schlegel to millimeters).

Distribution. North Celebes.

This species is only known by one specimen in the Leyden Museum, obtained by van Musschenbroek in the Minahassa. A very good species, the nine bars on the tail and the tarsi feathered down to the toes easily distinguishing it from the other Owls occurring in the Celebesian area.

† 36. STRIX CANDIDA Tick.

Grass Owl.

Strix candida *(1)* Tickell, J. A. S. B. II, 1833, 572; *(II)* Jerd., Ill. Ind. Orn. 1847, pl. 30; *(3)* id., B. Ind. I, 1862, 118; *(IV)* Gld., B. Asia pl. 18 (1872); *(5)* Sharpe, Cat. B. II, 1875, 308; *(6)* David & Oust., Ois. Chine 1877, 46; *(7)* Hume, Str. F. VI, 1878, 27; *(8)* Sharpe, P. Z. S. 1882, 335; *(9)* Davison, Str. F. X, 1883, 341; *(10)* Oates, B. Brit. Burmah 1883, II, 168; *(11)* E. P. Ramsay, Tab. List Austr. B. 1888, 2; *(12)* North, Nests & Eggs Austr. B. 1889, 24, pl. VI, fig. 5; *(13)* Tristr., Cat. Coll. B. 1889, 68; *(14)* Oates, ed. Hume's Nests & Eggs 1890, III, 95; *(15)* Steere, List Coll. B. Philipp. 1890, 8; *(16)* Wiglesw., Av. Polyn. 1891, 4; *(17)* Büttik., Zool. Erg. Webers Reise Ost-Ind. 1893, III, 272; *(18)* Rickett & H. Slater, Ibis 1894, 222; *(19)* Bourns & Worces., B. Menage Exped. 1894, 33.

a. **Strix longimembris** *(1)* Jerd., Madras Journ. 1839, X, 86.

b. **Scelostrix candida** Kaup; *(1)* Wald., Tr. Z. S. 1875, IX, 145.

c. **Strix amauronota** *(1)* Cab., J. f. O. 1866, 9; 1872, 316.

d. **Strix pithecops** *(1)* Swinh., Ibis 1866, 396, 397.

e. **Strix walleri** *(I)* Diggles, Orn. Austr. pt. VII, pl. (1866).

f. **Strix oustaleti** *(1)* Hartl., P. Z. S. 1879, 295; *(2)* Sharpe, ib. 1882, 335.

For further references see Sharpe *5*, *f 2*; Oates *10*.

Figures and descriptions. Jerdon *II*; Gould *IV*; Diggles *e I*; Sharpe *5*; David & Oust. *6*; Davison *9*; Oates *10*, *14* (egg); North *12* (egg).

Adult. Much like *S. flammea* in coloration (see description of *S. flammea rosenbergi, antea*), but easily distinguishable by its much more slender tarsi (girth of tarsus a little above the foot 23 mm, as against 34 mm in *rosenbergi*), lower third bare; under surface white, washed with buff on the chest, narrowly fringed with brown on the frill, and sparsely marked with small brown spots on the lower parts (Cebu, Oct. 1879 — Nr. 8269). Bill and cere pinky white; legs and feet bluish brown; irides deep brown; claws horny, tinged with bluish (Davison *9*).

Nestling. The young of *S. candida* is tawny, of *S. flammea* white (Gld. *IV*). Covered with long filamentous down of a dull orange-buff colour; the feathers of the upper parts, as far as developed, of a dark brown colour, spotted near the end of the shaft of the feathers with white, the basal parts of the dorsal plumes bright orange (Sharpe *5*).

Measurements. ♂ ad. Wing 335 mm; tail 135; tarsus 84; bill from gape 48; total length in the flesh 376; expanse 1155; weight 14 oz. (Davison *9*).

Egg. India — 4 or 5. Pure white, with very little gloss, and of a more elongated oval than those of *S. flammea*: 42 × 32.5 mm (Hume *14*); Australia — white, but have a slight bluish tinge; oval, rather swollen about the centre: 43 × 32 (North *12*).

Nest. Little or none, at most a little grass scattered and smoothed down in the midst of heavy grass-jungle; always on the ground. — India (Tickell *14*).

Breeding season. October—December: India (Hume *14*).

Distribution. India (Jerdon *3*, *IV*, etc.); Tenasserim — Tonghoo (Lloyd *7*, *10*); S. China (Rickett *18*); Formosa (Swinh. *d 1*, *6*); Philippines — Luzon (Jagor *c 1*, Steere *15*); Cebu (Meyer, Mus. Dresd., *b 1*); Siquijor (Steere *15*); Calamianes (Bourns & Worcester *19*); Celebes — Luwu, Gulf of Boni (Weber *17*); Australia — Queensland and New South Wales (Diggles *e I*, Ramsay *11*); Fiji Islands — Viti Levu (Kleinschm. *f 1*, *16*, Parr *8*).

The right of this species, the Grass Owl of Indian naturalists, to be included in the Celebes list rests upon a single specimen obtained by Prof. Max Weber in the Luwu District at the head of Gulf of Boni in February, 1889 (Büttik. *17*). This discovery helps to fill up a gap in the anomalous distribution of the species; and it may also be expected to turn up in other localities, where there is plenty of jungle-grass, between India and Australia. Hitherto its occurrences in widely isolated localities have led to an increase in its synonymy; as Sharpe remarks, "on a Philippine specimen being discovered, it was named *S. amauronota* by Prof. Cabanis; and in the same year Mr. Swinhoe found it in Formosa and called it *S. pithecops*. Shortly after, it turned up in Queensland, only to be named *Strix walleri* by Mr. Diggles; and now its last appearance, in the Fiji Islands, has gained it the additional cognomen of *S. oustaleti*" *(f 2)*. Dr. Sharpe believed these unexpected occurrences to be accounted for by its migrations, but it is now known to be a breeding species in Australia as well as in India. The distribution of Owls offers many peculiarities, which set all zoo-geographical boundaries at naught. Its possible causes — the nocturnal habits of these birds, the lightness of their plumage, and their liability to be carried by winds — are mentioned more fully elsewhere (p. 108).

Though very like *S. flammea* in general coloration, *S. candida* differs much

in habits, living, as Jerdon says, almost exclusively in long grass, for which its lengthy tarsi are well adapted, and its nest is made on the ground. Gould *(IV)* remarks upon the difference in coloration of the young of the two species, those of the Grass-Owl being tawny, of the Barn Owl white.

ORDER PSITTACI.

A Parrot may be recognised among other birds by its large hooked bill, covered at the base by a cere, by its toes placed two in front and two behind, the fourth one being reversed, — these two characters being indeed shared by the Owls; the foot is used on occasion as a hand in which it raises its food towards its bill; the bill, the upper mandible of which is moveable, is made use of in climbing, which it does much, though heavily; its food is generally of a vegetable character, fruits, seeds, nuts, etc., but some species eat insects also. The colours are generally bright, and all tints are found, including pure red, blue, and yellow, but green (especially Parrot-green) is the commonest colour. As to size, the Parrots number amongst them some of the smallest birds, with a body scarcely larger than a Humble Bee, while the largest attain the dimensions of a Raven or small Eagle. The tongue is thick and fleshy, or sometimes brushy or fringed; as is well known some forms are clever at imitating human speech.

The Parrots lay white eggs, 2—10 in number (Finsch), depositing them in holes chiefly in trees; the young are hatched helpless and naked. For further particulars: cf. Finsch, Papageien 1867, I, pp. 1—238; Salvadori, Cat. B. XX Psittaci 1891, pp. 1, 2.

FAMILY LORIIDAE.

"Bill much compressed, generally longer than deep, not notched, and smooth; culmen rounded and narrow; lower mandible rather long with the gonys narrow, straight, and obliquely slanting upwards, not flattened in front and with no keel-like ridge; upper mandible with no file-like surface on the under surface of the hook. Tongue brushy. Cere broader over the culmen and gradually becoming narrower along the sides of the bill. Tail graduated or rounded, sometimes even, rarely longer than the wings, generally shorter. Wing acute, with the three first quills generally the longest. Range: Australian Region (except New Zealand, but including Polynesia)" — Salvadori, Cat. B. XX, 11.

GENUS EOS Wagl.

Lories of about the size of a Turtle-dove (Salvadori), with a rather long — about $^3/_4$ the length of the wing — strongly-graduated tail, the outermost rectrice being about 4 cm shorter than the middle ones; wings moderately long, the three outermost primaries terminally narrowed, 2nd and 3rd the longest, secondaries short, the outermost reaching about half the wing-length; bill orange-red; plumage chiefly red, black and blue; wings chiefly red, or red and black (except in *E. fuscata*) by which *Eos* differs from *Lorius*, in which the wings are green. Salvadori recognises 11 species; they range from Talaut through the Moluccas to New Guinea and the Solomon Islands, occurring also in the Tenimber Islands and in Ponapé, Caroline Islands.

+ * 37. EOS HISTRIO (St. Müll.).

Red-and-blue Lory.

Under this species-name we include three subspecies, viz: — *the typical*[1]) *E. histrio* (Müll): Sangi; *E. histrio talautensis* M. & Wg.: Talaut; *E. histrio challengeri* Salvad.: Melangis.

+ 1. The typical Eos histrio (Müll.).

a. **Psittaca indica coccinea** Briss., Orn. 1760, IV, 376, pl. 25, f. 2.
b. **"Perruche des Indes Orientales"** *(I)* D'Aubert., Pl. Enl. 143.
c. **Psittacus histrio** Müll., S. N. Suppl. 1776, 76.
d. **"Lori Perruche violet et rouge"** Buff.; *(I)* Levaill., Perr. 1801—5, pl. 53.
e. **Psittacus indicus** Gm., S. N. 1788, I, 318.
f. **Psittacus coccineus** Lath., 1790; *(I)* Shaw, Gen. Zool. 1811, VIII, 461, pl. 68.
g. **Lorius coccineus** Steph.; *(1)* Schl., Mus. P.-B. Psittaci 1864, 128; *(2)* id., Rev. Psitt. 1874, 58.
h. **Eos indica** *(1)* Wagl., Mon. Psitt. 1832, 557; *(2)* Wall., P. Z. S. 1864, 290, 295; *(3)* Garrod, P. Z. S. 1873, 465, 634; 1874, 587.
i. **Eos coccinea** Sclat., P. Z. S. 1860, 227; Salvad., Orn. Pap. I, 1880, 268.
j. **Domicella coccinea** *(1)* Finsch, Papag. 1868, II, 800 (nec Talaut); *(II)* Rowley, Orn. Misc. 1878, III, 123, pl. 98; *(3)* Meyer, l. c. remarks; Meyer, Ibis 1879, 55; *(4)* Platen, Gefied. Welt 1887, 263.
k. **Eos histrio** Gray; *(1)* W. Blas., Ornis 1888, 563; *(2)* Salvad., Cat. B. 1891, XX, 21 (Sangi); *(III)* Mivart, Loriidae 1896, 23, pl. VII, figs. 1, 3.
l. **Lorius histrio** Koch; *(1)* Brüggem., Abh. Ver. Bremen 1876, V, 41, 101; Fischer, ib. 1878, 538, note.
m. **Domicella histrio** *(1)* Rchnw., J. f. O. 1881, 167; Consp. Psitt. 103; *(II)* id., Vogelb. 1883, t. XXXI, f. 1.
"Sumpihi", Siao and Great Sangi, Nat. Coll. in Dresden Mus.
For further synonymy and references see Salvadori *k 2.*

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[1]) The Sangi bird, as the first known from an exact locality, has the best right to this title. Levaillant's plate *(d I)* is not sufficiently accurate to represent the differences between it and the Talaut form.

Figures and descriptions. Rowley *j II*; Mivart *k III*; Levaillant *d I*; Shaw *f I*; Rchnw. *m II*; Wagl. *h 1*; Finsch *j 1*; Brüggem. *l 1*; Reichenow *m 1*; W. Blasius *k 1*; Salvadori *k 2*.

Adult. Poppy red; vertex (but not forehead and occiput), ear-coverts, hind neck, mantle, shoulders, breast and long tibial plumes bright hyacinth-blue; scapulars, tips of greater wing-coverts and of quills together with the exposed outer webs and tips of primaries black; numerous feathers on the red abdomen and under tail-coverts tipped with blue or black; tail dusky washed with violet, the inner webs red (Great Sangi — Nr. 1898).

"Iris orange-yellow; bill orange-red; feet dark grey" (Platen *k 1*).

In the young in certain parts of the plumage the blue is replaced by red, and the red by blue. Two young "males" described by Brüggemann have the whole head above and nape violet-blue, with some red tipped feathers on forehead and nape; mantle carmine-red changing into violet; the black of the back and wings more extended than in adult, the small upper wing-coverts tipped with black; the red feathers of the under surface irregularly tipped with violet, the colour of the breast band; rump dark carmine red (brownish red in adult). Similar young males are mentioned by Brüggemann *(l 1)* and Prof. W. Blasius *(k 1)*. Iris light brown; bill orange-yellow; feet grey (Platen *k 1*).

An immature bird from Siao (5. VII. 93) has the entire head above and neck poppy-red varied with violet feathers on the occiput and neck; under surface from breast downwards violet, washed with red, most strongly on the sides and middle of body where it is almost as much red as blue; red of rump rather darker than that of head. This specimen appears to be intermediate, passing into adult plumage (C 12588).

Variation of the young. It is in this species very puzzling. Of six specimens before us three (2 Talaut, 1 Tagulandang) have the crown, occiput and nape blue (in one mixed with red), the under parts in the Tagulandang bird and one of the others red, mixed with blue or dusky, in the third blue, mixed with a little red. The mixture of colours is not caused by entire feathers of different tints, but the individual feathers are parti-coloured. These specimens we take for birds in first plumage.

A second stage is that shown by the young example from Siao described above, with the under surface blue mixed with red, but the crown, occiput and nape red like the forehead (instead of blue). Some (old?) blue feathers are intermingled on the crown and nape, and there are a few blue feathers sprouting on the vertex, as well as red ones here and elsewhere on the head.

A young specimen, slightly more advanced towards maturity, has the under parts (except the thighs and flanks) almost uniform red, the blue breast-band only just commenced on the sides of the breast, the entire head above red, except for a few blue-tipped feathers (apparently old ones) on the vertex, and some new blue feathers are sprouting there (C 15296).

In the next stage there is a narrow breast-band and a narrow blue band on the vertex (C 13436).

These specimens therefore seem to prove the following:

First, the young has the head above, except the forehead, blue; the under parts varied with red and dusky blue. Next, the entire head und under parts change by moulting into red. Finally, the blue breast-band and vertex is acquired; at first it is narrow, afterwards broader.

Measurements.	Wing	Tail	Tarsus	Bill from cere
a. (Nr. 1898) ad. Gt. Sangi	175	135	20	23
b. (Nr. 3329) ad. Sangi Is.	161	124	19	20
c. (Nr. 3328) ad. Sangi Is.	178	136	20	24
d. (Nr. 3327) ad. Sangi Is.	154	134	18	20
e. (Nr. 3833) ad. Siao Is.	161	120	19	21
f. (C 12588) juv. Siao Is.	152	105	19	20

Four additional adult specimens from Siao (June—July 1893) have wing 164 to 165 mm, tail ca. 135; five other adults from Great Sangi (July) have wing 159—172.

Distribution. Great Sangi (Forsten *g 1*, Wallace *h 2*, Meyer *j 3*, Fischer *k 1*, Platen *j 4*), Siao (Hoedt, v. Duidenbode *g 2*, Meyer *j 3*, *2*).

2. Eos histrio talautensis (M. & Wg.).

n. **Domicella coccinea** *(1)* Finsch, Papag. 1868, II, 800 (ex Talaut).
o. **Eos indica** *(1)* Hickson, Nat. in N. Celebes 1889, 155.
p. **Eos histrio** *(1)* Salvad., Cat. B. XX, 1891, 21 (Saha).
q. **Eos histrio talautensis** *(1)* M. & Wg., J. f. O. 1894, 240; *(2)* iid., Abh. Mus. Dresd. 1895, Nr. 9, p. 3.
r. **Eos histrio** variety **talautensis** *(1)* Mivart, Loriidae 1896, 24A.

"Sampiri", Talaut, Nat. Coll.

Diagnosis. As shown elsewhere *(q 1)*, the Talaut bird differs from the typical form of Sangi as follows:

Talaut	Sangi
More red on the wings.	More black on the wings.
Secondaries red, with a black terminal edging 2—5 mm wide, narrowest in old individuals.	Secondaries red with a black terminal edging, 7—12 mm wide, narrowest in old individuals.
Wing-coverts in the adult almost uniform red, a black tip only on isolated feathers of the greater or middle series.	The greater wing-coverts tipped with black, forming a band across the wing; a second band is generally formed by black tips to the midde coverts.
The 1. primary narrowly edged on its basal half, the 3. primary broadly, with red.	The first 3 primaries externally black or the 1. only very narrowly edged with red, the 4. as broadly edged with it as the 3. in the Talaut birds.

Measurements (9 adults from Kabruang, Nov. 2nd—5th, 2 adults from Salibabu, Oct. 29th, and 6 adults from Karkellang, autumn 1896). Wing 163—171; tail 117—136; culmen from cere 19.5—21 mm. One immature: wing 157, tail 110.

Nearly all of these specimens are moulting, but the majority still retain their old primary quills. The moult probably lasts from September to December.

Distribution. Talaut Is. — Kabruang, Salibabu and Karkellang (Nat. Coll. in Dresd. and Tring Museums).

Observation. The first mention of an *Eos* in the Talaut Islands was made by von Rosenberg in a communication to Dr. Finsch; again Dr. Platen (Gefied. Welt 1887, 263) speaks of its existence in Talaut, remarking that this is the habitat of the birds seen in captivity in Sangi and Manado. Dr. Hickson saw the bird in plenty in

Talaut, and the good series obtained by our native hunters confirms the opinion of its abundance there.

In his beautiful Monograph of the Lories Dr. Mivart shows that he has misgivings as to the validity of the Talaut race, inasmuch as he supposes that the differences described as racial fall within the scope of individual variation of the form of Sangi. Probably extremes meet — otherwise the Talaut bird would come under the definition of species, not subspecies — but we have not yet found such extremes. 15 adults from Talaut and 5 adults from the Sangi Islands before us can be correctly sorted by a glance at the wing-coverts and tips of the secondaries, without looking at the labels, and these are only about one-half of those examined by us.

3. Eos histrio challengeri (Salvad.).

s. **Eos indica** *(1)* Sclat., P. Z. S. 1878; 578; id., Voy. Chall. B. 1881, 115; *(3)* Murray, Voy. Chall., Narr. 1885, I, 2, 669.

t. **Eos challengeri** *(1)* Salvad., Cat. B. XX, 1891, 22 (type examd.); *(II)* Mivart, Loriidae 1896, 25, pl. VII, f. 2.

Diagnosis. Very much like *E. histrio*, but much smaller, and with the blue colour on the breast less extended and more or less mingled with red (Salvad. *o 1*). Feet black; bill orange; eyes red, or light brown in the male (Murray *n 1*). Wing 152; tail 102, tarsus 17 mm.

Distribution. Melangis, Nanusa Islands (Murray *o 1*).

Observation. When the "Challenger" was dredging off the Nanusa Islands on 10th Febr. 1875, some natives came off in a boat from the southern island bringing with them four specimens of this parrot. Three of these are now in the British Museum, one of which we have examined. They appear to be the only birds yet known from these islands, and we question whether they are adult.

The Red-winged Lory, *Eos histrio*, affords an interesting case of differentiation into races within short distances, and it affords food for considering whether such variations may have occurred per saltum or by imperceptible gradations, and what may have been the cause. Such simple examples may contain perhaps a more ready answer to these difficult questions than the more complicated ones often attacked by students of evolution. It should be borne in mind, however, that "per saltum" and "gradually" are really vague terms; what one person may call a "jump", another may call a "gradation".

The genus *Eos*, comprising Red-winged Lories as distinguished from the typical *Lorius* in which the wings are green, ranges, according to Professor Reichenow and Count Salvadori, from the Solomon Islands through Papuasia to the Moluccas, occurring also in the Tenimber group and on the islands lying between North Celebes and Mindanao. The latter authority includes within the range of *Eos* the remote island of Ponapé or Puynipet in the West Carolines, the habitat of *Eos rubiginosa* (Bp.), which occurs on the island, as Dr. Finsch observed, in great numbers, doing much damage to the plantations of the colonists. The occurrence of *Eos* in localities north and east of Celebes, and its absence in this country as an indigenous species is somewhat remarkable; in the neighbourhood of Manado specimens of *Eos histrio* have indeed been

obtained, but these, according to Meyer's experience, as a rule show signs of having recently been in captivity in their worn tail-feathers, etc., and are to be regarded as specimens brought over from Sangi (or, as Dr. Platen affirms, Talaut) in the boats of the natives, and which have escaped.

At Manado "there seldom arrives a boat without bringing some living birds or the like" (Meyer *j 3*); and the locality Halmahera once stated to be the home of this species was most likely recorded on the ground of examples having been bought or of escaped birds shot there. The species as Mr. Wallace remarks is also brought over to Ternate, and Meyer saw a pair even in Cebu in the Philippines *(j 3)*.

To a similar cause, perhaps, is due the labelling of an example of *Eos riciniata* and two of *Lorius garrulus* in the British Museum as from Celebes, species belonging to the Halmahera group as shown by Count Salvadori (Cat. B. XX, 29, 41).

Eos histrio was first recorded from its true habitat, the Sangi Islands, by Forsten; later it was again obtained there by Mr. Wallace, and in the year 1871 in numerous examples by Meyer, and later again by Dr. Fischer. Writing in 1887 Dr. Platen remarks that it is by no means a common bird in Great Sangi, but that, in consequence of the ever-widening extent of the cocoa-nut plantations, it has retired more and more into the mountainous interior of the country, and the caged examples both here and those brought to Manado are derived from the neighbouring Talaut Islands *(j 4)*; but it is perhaps not impossible that the time of year of Dr. Platen's visit — the rainy season — may have had something to do with their scarcity near that part of the coast where he collected. The Talaut Islands, as mentioned above, were first noted as a locality for *Eos histrio* by von Rosenberg. Here the species was recently found in great abundance by Dr. Hickson, who confirms Dr. Platen's statement in remarking that it is comparatively rare in the Sangi Islands. An observation of much interest to ornithologists is recorded by Dr. Hickson in his account of his visit to the Saha Islands (Saka of the Dutch maps), two small islands, the one about three-quarters of a mile in diameter, the other about half as large, lying three or four miles, apparently, from the coast of Salibabu, one of the larger islands of the Talaut group. "My attention was called to these islands by a flock of lories, consisting of many hundred individuals, which flew from the main island to the larger of them as the sun was setting on the previous evening". This is one of the rare instances on record of a local species in these parts of the tropics voluntarily crossing a stretch of sea between one island and another, though indeed the birds probably only flew to their roosting place.

The circumstance, that wider excursions as a rule do not appear to occur frequently in these islands, tends to offer a contradiction to the opinion of writers of pessimistic views that the struggle for existence is distressingly severe. At all events the fact that birds of many families in the tropics become diffe-

rentiated into peculiar species in islands lying within sight of one another, in many cases being protected against overcrowding by laying only one or two eggs, does not lend any support to such a view.

According to the assurances of the best native hunter formerly in Dr. Meyer's service, *Eos histrio* in Sangi, like *Eos riciniata* (Bechst.) of Ternate, lays either two eggs or only one; in the latter case the young one produced is said to be bigger *(j 3)*. The allied *E. rubiginosa* of Ponapé nests in holes in trees, laying only one egg (Finsch, J. f. O. 1880, 284).

Eos histrio, according to Mr. Wallace (Geogr. Distr. I, 420), obliges us to place the Sangi Islands with the Moluccas instead of with Celebes; and this strange connection seems to be warranted by some other facts!

GENUS TRICHOGLOSSUS Vig. Horsf.

The species of this genus vary in size from that of a Lark to that of a Turtle-dove, the upper surface chiefly parrot-green; remiges below black or shining dusky grey; crossed with a band of yellow or red (not seen in the species which inhabit Celebes and Sula, except as an occasional remnant); tail strongly graduated; breast usually barred. About 16 species, ranging from Australia to New Caledonia and the New Hebrides, west through the Papuan Islands and the Amboina-group (but absent in the Halmahera-group), to Sula, Celebes, Timor.

+ * 38. TRICHOGLOSSUS ORNATUS (L.).

Ornate Lory.

a. **Psittacus ornatus** *(1)* Linn., S. N. 1766, I, 143 (ex Seba, Briss.); *(II)* Shaw, Gen. Zool. 1811, VIII, 416, pl. 60; *(3)* M. & S., Verh. Natuurk. Comm. 1839-44, 90, 182; *(4)* S. Müll., Reizen Ind. Archip. 1858, pl. II, 12; Reinw., Reis. Ind. Archip. in 1821, 1858, 592.

b. **La Perruche Lori** *(I)* Levaill., Perr. 1801, pl. 52.

Trichoglossus ornatus *(1)* Gray, Gen. B. 1846, II, 411; *(1bis)* S. Müll., Reiz. Ind. Arch. 1858, II, 69; *(2)* Rosenb., J. f. O. 1862, 60 (Sula); *(3)* id., N. T. Ned. Ind. 1862, XXV, 139 (Sula); *(4)* Wall., P. Z. S. 1864, 291, 295; *(5)* Schl., Mus. P.-B. Psittaci 1864, 112; *(6)* Finsch, Papag. 1868, II, 842; *(7)* Finsch & Conrad, V. z.-b. Ges. Wien 1873, 2, 15; *(8)* Schl., Mus. P.-B. Rev. Psitt. 1874, 49; *(9)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 645; *(10)* Brügg., Abh. Ver. Bremen 1876, V, 42; *(11)* Rosenb., Malay. Archip. 1878, 274; *(12)* Meyer, Ibis 1879, 53, 145; *(13)* Salvad., Orn. Pap. 1880, I, 299; *(14)* Rchnw., J. f. O. 1881, 160; id., Consp. Psitt. 1881, 96; *(XV)* id., Vogelb. 1878-83, pl. VIII, fig. 7; *(16)* W. Blas., Ztschr. ges. Orn. 1885, 220; *(17)* Guillem., P. Z. S. 1885, 544; id., Cruise "Marchesa" 1886, 180; *(XVIII)* Meyer, Vogel-Skelett. 1884, pl. LXX; Platen, Gefied. Welt 1887, 230; *(19)* Salvad., Cat. B. 1891, XX, 61; *(20)* Büttik., Z. Erg. Weber's Reise Ost.-Ind. 1893, III, 273; *(21)* M. & Wg., Abh. Mus. Dresd. 1895 Nr. 8, p. 5; *(22)* iid., ib. 1896 Nr. 2, p. 8; *(23)* Everett, Nov. Zool. 1896, 161; *(XXIV)* Mivart, Loriidae 1896, 119, pl. XXXIX; *(25)* Hartert, Nov. Zool. 1897, 159, 165.

"Parkitje" (from the Dutch), Minahassa, Meyer *12*.
"Kerut", inland name, Minahassa, Meyer *12*.
"Ulolito", Gorontalo, Rosenb. *6*, *11*; Joest.
"Dorra", Tjamba, S. Celebes, Platen *16*.
"Burong nuri", Bonthain, S. Celebes, Ribbe & Kühn in Mus. Dresd.
"Koloje", Tonkean and Balante, E. Celebes, Nat. Coll.
"Kaleki", Peling and Banggai, Nat. Coll.

For synonymy and further references see Salvad. *19*.

Figures and descriptions. Mivart *XXIV*; Shaw *a II*; Levaillant *b I*; Reichenow. *XV*, *14*; Meyer *XVIII* (skeleton); Finsch *6*; Brüggemann *10*; W. Blasius *16*; Salvadori *19*.

Adult male. Head above and ear-coverts hyacinth-blue; occiput poppy-red with dusky blue tips to the feathers; on side of neck from behind the ear-coverts a band of gamboge-yellow; all other upper parts parrot-green, some large, concealed, subterminal yellow spots on the feathers of the mantle, terminal fourth of the tail-feathers — except the two middle ones — yellow-red below where concealed by the under tail-coverts, etc.; cheeks and chin poppy-red; throat and breast poppy-red with broad terminal margins of dusky blue, giving a barred appearance; rest of under surface parrot-green becoming yellow-green on the lower abdomen and under tail-coverts, and chiefly gamboge-yellow on the sides; metacarpal edge parrot-green, under wing-coverts yellow; basal part of tail-feathers red (C 1028, Limbotto, N. Celebes, Aug.).

"Iris orange; bill light coral-red; cere dark brown; feet greyish green" (Platen *16*). Iris blackish blue and black; bill yellow-orange and red with black; feet greyish green and greenish (Ribbe & Kühn).

Female. Like the male, probably not smaller, the smallest wing-measurement (122 mm) of 14 examples in the Dresden Museum being that of a ♂.

Young. Red feathers of occiput nearly absent; parrot-green of abdomen much varied with yellow; dark bars on chest narrower than in adult; some feathers on cheeks margined with yellow (Minahassa, Nr. 3999).

Measurements. The wings of 17 specimens vary between 119—134 mm. Measurements of the smallest and the largest specimens; tail 75—84; tarsus 16; culmen from cere 19—20.5 (C 1031, Nr. 1947).

Skeleton.

Length of cranium	43 mm	Length of tibia	42 mm
Greatest breadth	23 »	Length of tarso-metatarsus	15 »
Length of humerus	27 »	Length of sternum	43 »
Length of ulna	29 »	Greatest breadth of sternum	22.5 »
Length of radius	27 »	Height of crista sterni	14 »
Length of manus	38 »	Length of pelvis	43 »
Length of femur	29 »	Greatest width of pelvis	22 »

Egg. White, 25 × 17 mm (Meyer *12*).

Breeding season. Near Manado, February *(12)*. As Finsch remarks, the *Trichoglossidae* nest in holes in trees, laying 2—4 eggs.

Variation. Cases of xanthochroism in this Parrot are apparently not rare. Specimens displaying a completely or partially yellow plumage are mentioned by Brüggemann *(11)*, Meyer *(12)* and Guillemard *(17)*. (As to xanthochroism in parrots see Meyer, Sitzb. Preuss. Akad. Wiss. 1882, 517.)

Distribution. Celebes, Togian Islands, Buton. North Peninsula — Minahassa (Forsten *5*, Wallace *19*, etc.); Gorontalo District (Rosenb. *8*, Meyer *12*); Banka and Mantehage

Island (Nat. Coll.); Togian Islands (Meyer *12*); E. Celebes — Balante and Tonkean (Nat. Coll.); S. E. Peninsula — Kandari (Beccari *9*); Buton (S. Müller *3*, *4*, *5*); West Celebes (Doherty *25*); South Peninsula—Bonthain (Weber *20*, Ribbe & Kühn in Dresd. Mus.); Macassar (Bernst. *8*, Wall. *19*); Boni (Mus. Leyd. *5*); Tjamba (Platen *16*); Sula Islands — Peling and Banggai (Nat. Coll.).

Von Rosenberg first recorded the Sula Islands as a locality for this species on information of one of the native chiefs of the islands *(3)*, but there was no evidence in proof of the correctness of this till specimens were obtained by our native hunters in Banggai and Peling. The hunter Kamis Birahi, who accompanied Bernstein, Wallace, v. Rosenberg and Meyer on some of their journeys, and who visited Sula, informed Meyer that *T. ornatus* did not occur in Sula.

It has not been recorded from Sangi, but Meyer received a specimen from Siao not differing in plumage from those of Celebes (MS. note), though this may have been from captivity.

As Dr. Finsch remarks Celebes forms the north-westernmost boundary of the genus *Trichoglossus* (the Wedge-tailed Lories) viewed as composed of Prof. Reichenow's subgeneric groups *Glossopsittacus*, *Charmosyna*, *Oreopsittacus*, *Neopsittacus* and *Trichoglossus*. Two of Prof. Reichenow's groups are further subdivided by Count Salvadori (Cat. B. XX, 1891): — *Charmosyna* into *Hypocharmosyna*, *Charmosynopsis*, *Charmosyna*; and *Neopsittacus* into *Psitteuteles*, *Ptilosclera* and *Neopsittacus*, but the last named genus, according to Salvadori, does not belong to the *Loriidae* at all, but to the *Cyclopsittacidae*. The Blue-headed group of Wedge-tailed Loris, to which *T. ornatus* belongs, ranges, as Count Salvadori shows, from Celebes throughout most of the intervening islands to New Caledonia and the New Hebrides, occurring also in the Lesser Sunda Islands and Australia. Curiously enough it is absent, so far as is yet known, in the Halmahera group, just as it is in Sangi.

The Blue-headed Lory of Celebes is a very distinct species, differing from all its fellows in having the cheeks, chin and throat red instead of blue, and the quills below uniform shining brownish smoke-grey, instead of having only their distal part of this colour and their basal part orange-yellow or red. Its nearest allies appear to be *T. massena* Bp. of S. E. New Guinea, New Britain and the neighbouring islands as far as the New Hebrides, and *T. cyanogrammus* Wagl. of Western Papuasia as far as Buru.

Although confined to Celebes, *T. ornatus*, like some of the *Trichoglossi* of Australia, is by no means a strictly sedentary bird in the island, where it is the commonest parrot. Meyer found it at all times and everywhere in the Minahassa from January till July; at Limbotto in August; near Gorontalo in September; on the Togian Islands in August; in South Celebes in October and November. About the end of March, 1871, it suddenly appeared in crowds in the neighbourhood of Manado. The *Trichoglossi* feed largely on the dews of flowers, using the tongue in a licking manner (Finsch, Papag. II, 816); fruit

also would appear to form a large part of their sustenance. *T. ornatus* feeds, "according to the season, on all possible fruits; in captivity they prefer bananas above everything, but also like rice" (Meyer *12*). In S. Celebes Ribbe & Kühn found in its stomach the fruits and the seeds of trees. The local movements of the species are most likely regulated by the time of ripening of fruit, or of flowering of certain trees. Gould observed, as Dr. Finsch points out (l. c. 815), that certain *Trichoglossi* are more or less birds of passage: "a few species seem to make periodically settled wanderings from the South, where they breed, to the North, when they gather themselves into countless flocks, which, hasten through the air with rushing speed like a cloud in regular evolutions and accompanied by deafening cries"; but, as the author adds, nothing is known about similar migrations, if such there be, among the insular species.

"*T. ornatus* smells, as all the allied parrots do, very agreeably of hyacinths" (Meyer *12*). It is kept as a pet by the natives of Celebes, but also used as an article of food.

+ 39. TRICHOGLOSSUS FORSTENI Bp.

Forsten's Lory.

Trichoglossus forsteni *(1)* Bp., Consp. Av. 1850, I, 3 (ex Temm. in Mus. Lugd.); *(2)* Finsch, Papag. II, 1868, 826; *(3)* Rchnw., J. f. O. 1881, 157 (Consp. Psitt. 23) syn. emend.; *(4)* Guillem., P. Z. S. 1885, 502; *(5)* Salvad., Cat. B. XX, 1891, 51; *(VI)* Mivart, Loriidae 1896, 93, pl. XXIX; *(7)* Hartert, Nov. Zool. 1896, 176, 572.

a. **Trichoglossus immarginatus** *(1)* Blyth, J. A. S. B. 1858, XXVII, 279.

For further synonymy and references see Salvadori *5*.

Figures and descriptions. Mivart *VI*; Finsch *2*; Reichenow *3*; Salvadori *5*.

Adult male. Above parrot-green; entire head, face, throat and mantle purple blackish blue, the forehead and cheeks striated with brighter blue, the feathers of the mantle with concealed red spots; around neck (not throat) a collar of greenish yellow; breast, sides, and under wing-coverts vermilion; abdomen blue-black; flanks, thighs, and under wing-coverts greenish yellow, barred with parrot-green; remiges below black, a band or patch of yellow across the basal part of the inner webs: "bill red, yellow at tip; feet olive-green" (Guillemard *4*). Wing 141 mm; tail 110; tarsus 17; bill from cere 18.5 (♂ nat. coll., Djampea Id., Dec. 1895: Everett, C 14861).

Sex. The sexes are closely similar in coloration (Finsch *2*).

Distribution. Sumbawa (Forsten *2*, Guillemard *4*); Djampea between Flores and Celebes (Everett *7*).

This Lory, previously known only from Sumbawa, was found recently to be common on Djampea Island by Mr. Everett, whose specimens were compared with the type of the species by Mr. Hartert who remarked that they were perfectly identical, but later found some slight differences (see below). It is one of a group of eleven known species, with the head and cheeks blue or dusky (or for the most part of these colours) and having a yellow — in one case a red — band across the base of the remiges; they are found from Australia to

Timor[1]) and Sumbawa in one direction, and from New Caledonia to the Moluccas in another. The present bird seems to be related to *T. haematodes* (L.) of Timor and to *T. novaehollandiae* (Gm.) of Australia, the former differing by its yellow breast and green occiput, the latter by its much brighter blue tints. *T. mitchelli* G. R. Gray, of which Prof. Mivart gives a good figure, appears to stand still closer to Forsten's Lory, but it evidently is easily distinguishable by having the head and middle of the abdomen dusky green, instead of purplish blue-black. The distribution of this form is as yet unknown.

Mr. Hartert *(7)* says that two males received by him from Sumbawa "have not such a broad blue patch behind the pale greenish band on the hind neck as all those from Djampea have"[2]).

* 40. TRICHOGLOSSUS MEYERI Tweedd.

Meyer's Lory.

This species is known in two forms in the northern and southern Peninsulas of Celebes, respectively:

1. The typical Trichoglossus meyeri.

a. **Trichoglossus flavoviridis** part. *(1)* Wall., P. Z. S. 1862, 337; 1864, 295 (Manado).

b. **Trichoglossus meyeri** *(1)* Wald., Ann. & Mag. N. H. 1871, VIII, 281; *(II)* id., Tr. Z. S. 1872, VIII, 32, pl. IV; *(3)* Schl., Rev. Psitt. 1874, 50; *(4)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 646; *(5)* Brüggem., Abh. Ver. Bremen 1876, V, 42; *(6)* Meyer, Ibis 1879, 54; *(7)* Rchnw., J. f. O. 1881, 156; Consp. Psitt. 1881, 92; *(VIII)* id., Vogelb. 1878-83, t. XI, fig. 3; *(IX)* Meyer, Vogel-Skelett. 1881-82, t. XXIV; *(10)* W. Blas., J. f. O. 1883, 125, 134; *(11)* Guillem., P. Z. S. 1885, 544; *(12)* Platen, Gefied. Welt 1887, 206, 230; *(13)* M. & Wg., Abh. Mus. Dresd. 1895 Nr. 8, p. 5; *(14)* iid., ib. 1896 Nr. 1, p. 7.

c. **Psitteuteles meyeri** *(1)* Salvad., Cat. B. 1891, XX, 63; *(II)* Mivart, Loriidae 1896, 125, pl. XLI.

"Parkitje lolaro" (Mangrove Paroquet), Manado, Meyer *b 6*; Guillem. *b 11.*

Figures and descriptions. Walden *b II, b 1*; Mivart *c II*; Reichenow *b VIII, b 7*; Meyer *b IX* (skeleton); Salvadori *b 4, c 1*; Brüggem. *b 5.*

Adult male. Parrot-green; feathers of mantle with yellow bases; head above golden-olive, yellower on forehead; ear-coverts bright yellow; feathers of lores, cheeks and chin barred with ochraceous and tipped with dull green; below yellow with a light greenish wash, each feather broadly bordered with parrot-green, abdomen and under tail-coverts strongly washed with green; under wing-coverts light yellow-green, at the metacarpal edge grass-green; quills below uniform shining brownish smoke-grey; tail below deep olive-yellow (♂ Rurukan, 3. IV. 94: P. & F. S.). "Iris cherry-red; feet greyish blue; bill orange-red" (Meyer *b 1*).

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1) In recording the habitat of the allied *T. haematodes* (L.) Count Salvadori mentions only Timor. Other writers add Wetter (Schl., Rev. Psitt. 1874, 48), Samao (Rchnw., Consp. Psitt. 1881, 98) and Sumba (Meyer, Verh. z.-b. Ges. Wien 1881, 762; Hartert, Nov. Zool. 1896, 586), but these localities appear to have been intentionally omitted in the Catalogue of Birds, in anticipation of the occurrence of local differences of plumage in these islands. This caution appears to be fully justified; the two specimens from Sumba in the Dresden Museum differ from two others of unknown origin in being much larger, and in having the under wing-coverts yellow instead of flame scarlet.

2) Since this was written Mr. Hartert has named the Djampea birds *T. forsteni djampeanus* (Nov. Zool. 1897, 172).

Female. Differs from the male in having the head above much darker and duller — viz. brownish green with a suggestion of purplish therein in certain lights (♀ Rurukan, 3. IV. 94, P. & F. S.).

Younger. Crown of head more yellow-green, scarcely yellower on the forehead; yellow of under surface greener; inner margin of quills yellowish; some of the same colour spread out on the inner webs of some of the inner primaries. A trace of green barring near tip of tail (Nr. 1746). Bill dark.

Distribution. North Celebes — Manado (Wallace *a 1*, Meyer *b 1*, v. Duivenb. *b 3*, etc.); Rurukan — 3000 ft. (Platen *b 12*, P. & F. S.); (?)Gorontalo (Brit. Mus. *c 1*); Central Celebes between Lake Posso and Mapane (P. & F. S. *b 14*).

† 2. Trichoglossus meyeri bonthainensis (Meyer).

d. **Trichoglossus meyeri** var. **bonthainensis** *(1)* Meyer, Isis 1884, 16; *(2)* Salvad., Cat. B. 1891, XX, 64 note; *(III)* Mivart, Loriidae 1896, 127, pl. XLI, figs. 2, 3.

Figures and descriptions. Mivart, Meyer, Salvadori ll. cc.

Diagnosis. Key to the two subspecies:

1. The subterminal bars on the feathers of lores and cheeks broader and ochraceous in colour; the green bars of the under surface narrower. *The typical T. meyeri.*
   Distr. North Celebes.
2. The subterminal bars on feathers of lores and cheeks narrower, dull apple-green; the green bars of the under surface broader; the yellow bases of feathers of mantle less developed . . . . . *T. meyeri bonthainensis.*
   Distr. Mt. Bonthain, S. Celebes. (Ribbe & Kühn.)

Measurements.

	Wing	Tail	Tarsus	Culmen from cere
a. (Nr. 1745) Manado	108	67	13	14.5
b. (Nr. 1747) Manado	103	63	12	14.5
c. (Nr. 1746) imm. Celebes	101	57	12.5	13.5
d. (Sarasin Coll.) ♂ ad. Rurukan, 3. IV. 94	102	63	13	15.5
e. (Sarasin Coll.) ♀ ad. Rurukan, 3. IV. 94	101	58	12	14
f. (Sarasin Coll.) ♂ juv. Rurukan, 4. X. 94	102	61	—	14
g. (Sarasin Coll.) juv. Centr. Celebes, 23. II. 95 . . .	101	62	11.5	13.5
h. (Nr. 6007) Bonthain, S. Celebes (type of *bonthainensis*)	106	68	13	15.5

The type-specimen of *bonthainensis* remains up to the present the only one on record from any part of South Celebes.

The group of small Green Wedge-tailed Lories of the subgenus *Psitteuteles*, according to Count Salvadori, is found in one species in Australia, one in the Timor group, one in Celebes and one in Sula. It is curiously absent in the Moluccas and Papuasia, as also in Sangi. In the latter islands, the genus *Eos*, which is absent in Celebes, occurs, but *Trichoglossus*, which is represented in two species in Celebes is not found there at all, or at least it has not yet been discovered there. Perhaps these facts have a certain relation to one another, it may be suggested that one species ousts the other from this or that locality by seizing the food they both eat. In Amboina and elsewhere nearer to the eastern centre of development of the parrot tribe, however, both a species of *Eos* and of *Lorius* and a Blue-headed *Trichoglossus* occur together.

Count Salvadori's excellent keys for the determination of the Green Wedge-tailed Lories of the subgenus *Psitteuteles* and the Blue-headed ones of the subgenus *Trichoglossus* awake the attention to an interesting fact. In Celebes the members of both subgenera have the underside of the quills uniform shining brownish smoke-grey; in all parts of Australasia where they occur both subgenera have the basal part of the quills crossed by a band of bright colour — yellow usually, but in two cases — one in each subgenus — red. The circumstance is, of course, suggestive of a common cause, but a difficulty to the maintaining of this opinion is presented by the fact that the *Trichoglossus*, which has the red band, does not occur in the same locality as the *Psitteuteles* with the red band, but one (*T. rosenbergi* Schl.) on Mysore Island in Geelvink Bay, New Guinea, and the other (*Ps. chlorolepidotus*) in Australia. We are, however, from the following circumstance able to conclude at least on good hypothetical grounds that the Celebesian forms are of a more recent development than the Australasian ones: three young specimens and one female of *T. meyeri* described above differ from the old ones amongst other points in having some amount of yellow on the inner webs of some of the inner remiges, in one case very obviously the remains of a wing-band; in two or three immature specimens of *T. ornatus* also (Nrs. 3999, 6580) we find a trace of the yellow band on one or two feathers of the secondaries, but not in any adult specimens, nor in other specimens not quite adult. This appearance indicates that *T. meyeri* and *ornatus* are sprung from two forms which possessed a yellow wing band[1]). There is thus reason to suppose that the *Trichoglossi* of Celebes are a development more recent than those of Australia. For this reason no one can very well advance the supposition that the Australasian forms came from Celebes, but on the other hand it will generally be felt that this is some sort of evidence that Celebes was originally colonised by *Trichoglossi* from Australasia, and then for some unknown reason they lost the wing-band in Celebes.

Trichoglossus meyeri finds its nearest ally in *T. flavoviridis* Wall. of the Sula Islands, which shares with it the peculiarity of having no coloured band on the under side of the wing. As already mentioned Count Salvadori's work shows that this group of Wedge-tailed Lories does not occur further East; and the single species inhabiting the Lesser Sunda Islands, *T. euteles* Temm. (a form which will perhaps have to be broken up into several subspecies) differs markedly from those of Celebes and Sula. The first notice of *T. meyeri* was made by Mr. Wallace, who obtained a specimen in Manado, but the skin was destroyed and the author identified the bird doubtfully with *flavoviridis* of Sula (*a 1*). In 1866 a specimen was sent to the Leyden Museum by van Duivenbode, but apparently not recognised as new by Schlegel; five years afterwards numerous specimens were obtained in the Minahassa and recognised as new by Dr. Meyer;

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[1]) Young specimens of *Charmosyna pulchella* Gray also have a very plain yellow band at the base of the secondaries and inner primaries, which disappears in the adult.

it was named *T. meyeri* by Lord Walden. Wallace believed the species to be rare in Celebes, in consequence of the competition of the abundant *T. ornatus*, which does not occur in Sula; like *T. ornatus*, however, it makes considerable local movements, depending no doubt on the time of flowering or fruit-bearing of certain trees, and at the end of April, 1871, *T. meyeri* appeared in the neighbourhood of Manado in flocks (as did also about the same time *T. ornatus*, *Loriculus stigmatus* and *L. exilis*), and could always be procured till the 18th of May, after which date it became scarce. Dr. Platen appears to have found both *T. ornatus* and *meyeri* plentiful at Rurukan (3000 ft.). Of the latter he writes that it is never kept in captivity like *T. ornatus*, though both will feed on broken biscuit and powdered canary seed. *T. meyeri* is of a much quieter and gentler nature than *ornatus*, perhaps the cause of its not being cared for as a pet *(b 12)*. A tame female of *T. meyeri* in Dr. Platen's possession laid an egg in November. The breeding season of the species in freedom is unknown.

♀ * 41. TRICHOGLOSSUS FLAVOVIRIDIS Wall.

Yellow-green Lory.

Trichoglossus flavoviridis *(1)* Wall. P. Z. S. 1862, 337, pl. XXXIX; id., 1864, 295, 292 pt.; *(2)* Finsch, Papag. 1868, II, 849; *(3)* Wald., Ann. N. H. 1871, VIII, 281; *(4)* Schl., Rev. Psitt. 1874, 49; *(5)* Rchnw., J. f. O. 1881, 156 (Consp. Psitt. 1881, 92); W. Blas., J. f. O. 1883, 125.

a. **Psitteuteles flavoviridis** *(1)* Salv., Cat.B.XX, 1891, 63; *(II)* Mivart, Lor. 1896, 123, pl. XL.

For further references see Salvadori *a 1.*

Figures and descriptions. Wallace *I*; Mivart *a II*; Finsch *2*; Reichenow *5*; Salvad. *a 1.*

Adult. Green; head olive-yellow; nape with a dusky collar; face, cheeks and chin dusky green, each feather margined with yellow; face, neck, breast, and upper part of the belly bright yellow, each feather narrowly margined with dark green, producing a regular scaly appearance; belly, vent and under tail-coverts yellowish green with green edges to the feathers; the interscapulary feathers with concealed yellow bands; quills dusky black underneath; tail-feathers beneath ochre-yellow: bill orange-red; orbits bare, yellow; feet lead-colour; iris orange. Total length 216 mm; wing 122; tail 81; bill 18; tarsus 13 (Salvad. *a 1*).

Distribution. Sula Islands (Allen *I*) — Sula Besi (Hoedt *3*); Sula Mangoli (Bernst. *3*).

This species is the only member of the *Loriidae* known to occur in the Sula Islands, being very nearly related to *T. meyeri* of Celebes, from which it differs in having the head yellow, the chin and a nuchal collar dusky, and the yellow of the breast without any greenish tint. It was first obtained by Wallace's assistant, Allen, who appears to have found the species abundant. The islands in which he collected were the southern and eastern ones of the group, i. e. Sula Mangoli and Sula Besi. Ten specimens from these islands were subsequently sent by Hoedt and Bernstein to the Leyden Museum in 1864. As already noticed, the occurence of closely allied species in Sula and Celebes, and the non-occurrence of the subgenus *Psitteuteles*, so far as is known, in the Moluccas a little further east, is of interest in questions of geographical distribution.

FAMILY CACATUIDAE.

"Sternum complete; orbital ring completely ossified, with a process bridging the temporal fossa (Garrod, P. Z. S. 1874, 594); nostrils open in a cere not much swollen, generally naked but sometimes feathered; bill very deep, deeper than long, with the upper mandible generally much compressed; hook of the upper mandible nearly perpendicular, except in *Licmetis*, and with a file-like surface underneath; tarsus short; head always crested; as a rule only the left carotid present" (Salvadori, Cat. B. XX, 101). Coloration uniform.

Five genera found in Australia, two thereof passing into Papuasia, and one of the latter, *Cacatua*, further to the Philippines, Celebes, and the Lesser Sunda Islands.

GENUS CACATUA Vieill. ex Briss.

Map V.

The species of this genus are of rather large size — from that of a Jackdaw to a Raven almost — and are well characterized by their white or rosy — (in one case deep rose-coloured) plumage, their crests, and perpendicularly-hooked bills. Fuscin, a colour which, when overlaid with psittacofulvin, gives parrot-green, is absent in the Cockatoos (Krukenberg). The genus *Cacatua* is composed of 15 species, which, as shown in the following article, fall into three natural groups, with a distribution from Australia to Lombok, Celebes, the Philippines, Moluccas, the Papuan Islands to the Solomon group.

† 42. CACATUA SULPHUREA (Gm.).

Sulphurous Cockatoo.

According to Mr. Hartert (Nov. Zool. 1897, 165) this form embraces three subspecies. They are:

1. The typical Cacatua sulphurea.[1])

a. **Psittacus sulphureus** *(1)* Gm., S. N. 1788, I, 330 (ex Briss. and Edwards); *(2)* S. Müll., Verh. Natuurk. Comm. 1839—44, 90, 182; id., Reizen Ind. Arch. 1857, 12; *(3)* Russ, Fremdl. Stubenvög. 1881, IV, 655—658.

b. **Psittacus cristatus** *(1)* Labill., Voy. à la Recherche de la Pérouse 1791—92, II, 301.

c. **Cacatua sulphurea** *(1)* Vieill., N. D. 1817, XVII, 10; *(2)* Schl., Mus. P.-B. Psitt. 1864, 137, pt.; *(3)* Fraser, P. Z. S. 1865, 227; *(3bis)* Schl., Ned. Tdschr. Dierk. 1866, III, 319, 321; *(4)* Garrod., P. Z. S. 1873, 460, fig. 6 (carotids), 461, 465, *(5)* id., ib. 1874, 587, 588, 591, 595; *(6)* Schl., Rev. Psitt. 1874, 66; *(7)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 644; *(8)* Brüggem., Abh. Ver. Bremen, 1876, V, 37; *(9)* Rosenb.,

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[1]) Many authors spell this word "*sulfurea*", but this is not the original spelling of Gmelin, nor indeed the more correct.

Mal. Archip. 1878, 275; *(10)* Meyer, Ibis 1879, 44, 145; *(11)* Krukenberg, Vergl. physiol. Studien 1882, II, 2. Abth., 29, 33, 35; *(XII)* Meyer, Vogelskelette 1881—82, t. XVIII; *(13)* W. Blas., Ztsehr. ges. Orn. 1886, 195; *(14)* W. Marsh., Z. Vortr. Die Papag. 1889, 31; *(15)* Salvad., Cat. B. XX, 1891, 121; *(16)* Büttik., Z. Erg. Weber's Reise Ost-Ind. 1893, III, 273; *(17)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 5; *(18)* iid., ib. 1896, Nr. 1, p. 7; *(19)* Hartert, Nov. Zool. 1897, 164.

d. **Plyctolophus sulphureus** *(I)* Lear, Ill. Parrots 1832, pl. 4; *(II)* Selby, Nat. Libr., Parrots 1836, 129, pl. 14; *(3)* Nitzseh, Pterylogr. 1840, 146; id., Engl. Ed. 1867, 102.

e. **Psittacus sulphureus minor vel moluccensis** *(I)* Bourjot, Perr. 1837—38, pl. 80.

f. **Plictolophus sulfureus** *(1)* Finsch, Papag. I, 1867, 296—300, pt., II, 1868, 942; *(II)* Rchnw., Vogelbilder, 1878—83, t. IV, f. 1.

g. **Plissolophus cristatus** *(1)* Rehnw. (nec. L.), J. f. O. 1881, 29 (Consp. Psitt. 1881, 29).

"Katella" or **"Catala"**, Gorontalo Dist., Rosenb. *d 1*, 9.

"Gatalla" and **"Cacatua puti"** (malay), Meyer *10*.

For further synonymy and references see Salvad. *15*.

Figures and descriptions. Lear *d I*; Selby *d II*; Bourjot *e I*; Reiehenow *f II*; Meyer *c XII* (skeleton); S. Müller *a 2*; Schlegel *c 2*; Garrod *c 4*, *c 5* (anat.); Finseh *f 1*; Salvadori *c 15*.

Adult ♂. White, with a light wash of sulphur-yellow, especially strong on the under surfaee, under side of wings and of tail; erest (85 mm), ear-coverts and basal part of the remaining feathers of head deep sulphur-yellow. (The mantle and wings above of this and of 8 other specimens are nearly white without any yellow wash to speak of, but this hue seems to fade through exposure, as it may be found at the bases of the feathers and on the lower back and upper tail-eoverts under eover of the wings. — Kwandang, North coast of Celebes, — Nr. 3536). Iris of adult red (Meyer *10*).

Female. Like the male, but with a smaller bill.

Young. The yellow of the plumage much less intense than in the old ones; iris dark — either blaek or brown (Meyer *10*).

Aceording to Finsch the nestlings of the white Coekatoos are elothed in long white down (Papag. I, 272); the same author mentions a young one of the Flores speeies, which is very elosely related to the Celebesian one, in which the yellow feathers of the ear-eoverts were in proeess of development (l. e. 297)[1]).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (Nr. 3536) ♂ Kwandang, N. Cel.	236	110	19.5	39
b. (Nr. 3535) ♂ Kwandang, N. Cel.	235	116	20	40
c. (Nr. 3537) ♀ Paguatt, Tomini Bay	232	114	19	35
d. (C 1331) ♀ Paguatt, Tomini Bay	235	116	—	34.5
e. (C 1329) ♀ Paguatt, Tomini Bay	230	114	—	35.2
f. (C 1325) ♂ Paguatt, Tomini Bay	243	122	—	37
g. (C 1330) ♀ Kwandang, N. Cel.	221	110	—	35
h. (C 6590) ? Gorontalo Distr.	230	110	—	38.5
i. (Nr. 3538) ? Gorontalo Distr.	243	113	—	40.5
j. (Sarasin Coll.) ♀ Buol, N. Cel., 15. VIII. 94	237	115	—	34
k. (Sarasin Coll.) ♂ Maroneng, Gulf of Mandar, 18. VIII. 95	234	110	—	39

[1]) The entire series of this genus in the British Museum are, without exception, marked by Count Salvadori as adult!

Distribution. Celebes and Buton — Tomini (Forsten *c 2*), Paguatt, Tomini Gulf (Rosenb. *c 6*, Meyer *c 10*), Posso, Tomini Gulf (Meyer *c 10*), Kandari, S. E. Celebes (Beccari *c 7*), Buton (Labillardière *b 1*, S. Müller *a 2*), Maros, S. Celebes (Weber *c 16*), Mandalli, W. Coast (Meyer *c 10*), Maroneng (P. & F. Sarasin), Dongala and Tawaya, W. Coast (Doherty *c 20*), Kwandang, N. Coast, and the small islands in Kwandang Bay (Meyer *c 10*, Rosenb. *c 6*, *c 9*), Buol (P. & F. Sarasin).

♀ 2. C. sulphurea djampeana Hartert.

Nov. Zool. 1897, 164.

h. **Cacatua sulphurea** *(1)* Hart., Nov. Zool. 1896, 176.

Diagnosis. Exactly like the *typical C. sulphurea* of Celebes, but with a smaller beak measured straight from the outer margin of the cere, where maxilla and mandible meet, to the tip — in two examples 24 mm, in one only 23.5, as against 27 mm in females from Celebes (Hartert l. c.).

Distribution. Djampea Island (Everett *h 1*).

3. C. sulphurea parvula (Bp.).

For synonymy, etc. cf. Salvadori, Cat. B. XX. 1891, 120.

Diagnosis. Similar to the *typical C. sulphurea* of Celebes, but the ear-coverts paler and much less yellow (Hartert).

Distribution. Lombok, Sumbawa, Flores, Semao, Timor.

Observation. We cannot regard Mr. Hartert's division as conclusive; if one were only to investigate closely enough further racial peculiarities would no doubt be found.

The distribution of *Cacatua sulphurea* in Celebes is a remarkably interrupted one. In the Minahassa it is unknown as a wild bird, as it is also at Macassar and Maros in the South; this also appears to be the case at Gorontalo, though it is to be met with on the coast of the gulf at Paguatt and Posso, as also twenty miles from Gorontalo at Kwandang on the north coast, and again further west at Buol. At Posso, on the south shore of the Gulf of Tomini, Meyer first met with it in large flocks; but on the same coast further east at Todjo it was not then to be found, neither does it appear to occur on the Togian Islands[1]). Labillardière in one of the early French voyages was the first to notice it at Buton Island; afterwards Salomon Müller saw it in large numbers there: "Before nearly all the houses we saw Cockatoos and other species of parrots fastened by a small double ring of buffalo-horn or cocoa-nut on one foot to sticks, etc."; *Psittacus sulphureus* was most abundant, in much smaller numbers *Ps. ornatus* and *Ps. setarius (P. platurus)*. A good reason for this peculiar distribution is not easy to find, but the data known are scanty and insufficient and may partly rest on observations of local movements and if more facts were to hand, a different sketch of distribution of the species might perhaps be drawn up.

The distribution of the genus *Cacatua* is likewise somewhat anomalous. The

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[1]) The species is included in the list of Togian birds collected by Meyer in 1871 *(10)*, but this indication is a mistake.

fifteen species comprising the genus, as recognised by Count Salvadori, are placed by Prof. Reichenow in his Conspectus Psittacorum in two subgenera, — the characters of which were first clearly shown by Dr. Sclater in 1864 (P. Z. S. 1864, 188) — recognisable by possessing a long, recurved crest of narrow feathers, or a crest of broadened feathers generally decurved, respectively. Each of these subgenera consists of two sections, the characters of which are well pointed out by Reichenow.

Dr. Finsch makes a different division of the genus *Cacatua* in his key to the species, gathering the species into two groups distinguishable by having 1. the nostrils and cere naked and the bill black, or 2. the nostrils and cere feathered and the bill light.

To our mind the genus shows itself to be composed of 3 natural groups:

1. Bill large, black; cere and nostrils naked; crest long, of narrow feathers, curving upwards at the extremity:
   C. galerita (Lath.): Australia, Tasmania.
   C. triton (Temm.): New Guinea and the islands close by; Aru.
   C. citrinocristata (Fraser): Sumba.
   C. parvula (Bp.): Timor, Semao, Flores, Sumbawa, Lombok.
   C. sulphurea (Gm.): Celebes; Buton.

2. Bill comparatively small, white or horn-colour or yellowish; cere and nostrils feathered; crest of short broad feathers, decurved — in one case *(C. leadbeateri)* lengthened and recurved:
   C. sanguinea Gld.: N. Australia.
   C. goffini (Finsch): Timorlaut.
   C. ducorpsi J. & P.: Solomon Is.
   C. gymnopsis Sclat.: Australia.
   C. haematuropygia (P. L. S. Müll.): Philippine and Sulu Islands.
   C. roseicapilla Vieill.: Australia.
   C. leadbeateri (Vig.): S. Australia.

3. Bill large, black; cere and nostrils naked; crest of very long broadened feathers, more or less decurved:
   C. alba (P. L. S. Müll.): Halmahera Group.
   C. ophthalmica Sclat.: New Britain.
   C. moluccensis (Gm.): Ceram, Amboina.

To these points it may be added that in *C. galerita* of Group 1, and in *C. leadbeateri* of Group 2, the oil-gland has been found to be present; in *C. alba* of Group 3 it is generally absent, or reduced to a small membranous mamilla (Garrod *5*, Nitzsch *b 3*). It is stated by Garrod that the oil-gland has not been found in *C. sulphurea*, but, according to Nitzsch, it is present.

It has been stated that Meckel found a right carotid artery of reduced

calibre in *Cacatua sulphurea (4, 5)*; in a specimen of that species dissected by Garrod "the left only was present, as in *C. cristata* (= *alba*), *C. leadbeateri* and *C. galerita*" *(5)*. In all other Parrots examined by Garrod the two carotids were present; and that author remarks that the genus *Cacatua*, like the *Passeres* and many others, has lost its right carotid, and in this respect has departed most from the ancestral type.

Judging from the fact that three of the five genera of *Cacatuidae* recognised by Count Salvadori are confined to Australia, and that the other two (though *Microglossus* is perhaps rather Papuan than Australian) also occur there, and that five of the fifteen species of *Cacatua* proper are peculiar to Australia and the other ten distributed interruptedly between Australia and the Philippines, it is evident that unless proof to the contrary is found Australia should be looked upon as the chief region of development of the family. Elsewhere no two species of the genus *Cacatua* are known in the same locality. It would appear that, by reason of competition, no island is able to harbour more than one species of a section of the genus *Cacatua*; and the suggestion, that one species has crowded out another of another section affords perhaps the most reasonable ground to account for their anomalous distribution.

Gould says that in Australia *C. sanguinea* and *C. galerita* are often seen in company. This, of course, primarily denotes that their food is the same, and that there is plenty of it; if there were not sufficient for both, one species would soon become impatient of the other's company.

As Krukenberg discovered, the yellow colour of the crest of *C. sulphurea* and of some other Cockatoos is due to the presence of pure psittacofulvin, the same pigment, which when laid over a darker ground pigment (fuscin) — not present in the Cockatoos, — gives the colour known as parrot-green. The yellow pigment was also found by him in the apparently white feathers of *C. sulphurea*, a circumstance which led him to suppose that the young feathers are yellow and lose the yellow effect as they become full grown, by reason of the distribution of the pigment over a wider area, and of the action of light *(11)*; but this is not the case as is shown by sprouting feathers in skins before us. Light, however, certainly exercises a blanching effect upon them. The nestling of other species is clothed in long white down, as Finsch states; that of *C. sulphurea* is unknown. Prof. Marshall expresses the opinion that the delicate red and yellow tones of the plumage of Cockatoos is due to the fine epithelial dust cast off by the powder-down feathers — which are highly developed in Parrots — acting like a powdery pigment on the contour feathers *(14)*. But this is not the case in *C. sulphurea*, where the powder-down feathers are white and the dust cast off of the same colour. The white Pigeons of the genus *Myristicivora* are saturated with a similar yellow, which soon fades after death on exposure to the light, leaving the birds white. Such is also the case with the salmon-colour with which the white breast of the Moleo is tinted.

Nothing is known of the breeding of *C. sulphurea* in freedom, but in captivity cases are on record of its laying two or three eggs at a sitting (Fraser *3*, Russ *a 3*).

FAMILY PSITTACIDAE.

"It is extremely difficult to define the *Psittacidae* by positive characters. They are separated from the *Stringopidae* by having a complete sternum, from the *Nestoridae*, *Loriidae*, and *Cyclopsittacidae* by the file-like surface on the palatine portion of the hook of the bill, and from the *Cacatuidae* by the absence of a crest (except in *Nymphicus*)" — Salvadori, Cat. B. XX, 137. The family ranges almost all over the warmer parts of the world.

Count Salvadori recognises 6 subfamilies of the *Psittacidae*, one of which, the *Palaeornithinae*, is represented by several genera in the Celebesian area. In this subfamily the tail is soft, sometimes very long and graduated, sometimes short and square, or wedge-shaped; the furcula is present (except in the genera *Agapornis* and *Psittacula*), the left carotid is normal, like the right one running in the hypoapophysial canal; orbital ring always incomplete; sides of the head feathered, if naked, only immediately round the eyes; bill moderate, or very strong, deeper than long (in *Loriculus* long and thin), smooth, mostly red, sometimes black, or yellow; sexes generally different. Australian, Oriental and Ethiopian Regions — cf. Salvadori, t. c. pp. 137, 386.

GENUS PRIONITURUS Wagl.

The Racket-tailed Parrots are easily recognisable when adult by the two middle tail-feathers, the shafts of which are prolonged beyond the others and tipped with a spatule of ordinary feather-construction; tail — except for the two middle feathers — square. The general colour is yellowish parrot-green; the under surface of the remiges where they rest upon the body verditer-blue, elsewhere black or blackish. Nine species and races have been described; they inhabit the Philippines, the Celebesian Province, and, possibly, Buru.

* 43. PRIONITURUS PLATURUS (Vieill.).

Blue-billed Racket Parrot.

Plates V and VI.

a. **Psittacus platurus** *(1)* "Temm.", Vieill., N. Dict. N.H. 1817, XXV, 314 (Nouvelle Calédonie!); *(2)* Russ, Fremdl. Stubenvög. 1881, 491.

b. **Psittacus setarius** *(1)* Temm., Pl. Col. 1824, 15 (Timor!); *(2)* Müll. & Schl., Verh. Natuurk. Comm. 1839—44, 90, 107, 182 (Buton); S. Müll., Reiz. Ind. Archip. 1857, II, 12.

Prioniturus platurus *(1)* Wagl., Mon. Psitt. 1832, 523; *(2)* Wall., Ibis 1860, 141; *(3)* Wald., Tr. Z. S. 1872, VIII, 32; *(4)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 645; *(5)* Brüggem., Abh. Ver. Bremen 1876, V, 39; *(6)* Lenz, J. f. O. 1877, 362; *(7)* Meyer, Ibis 1879, 49, 145; *(8)* Rchnw., J. f. O. 1881, 255 (Consp. Psitt. 1881, 143); *(IX)* id., Vogelbild. 1878—83, t. XXVII, f. 5; Meyer, Isis 1884, 6; *(X)* id., Vogelskel. 1884, t. LXVII; *(11)* Guillem., P. Z. S. 1885, 543; *(12)* W. Blas., Ztschr. ges. Orn. 1885, 212—219, figs.; *(13)* Platen, Gefied. Welt 1887, 219, 231; *(14)* W. Blas., Ornis 1888, 559; *(15)* Salvad., Cat. B. XX, 1891, 415; *(16)* M. & Wg., Abh. Mus. Dresd. 1895 Nr. 8, p. 5; *(17)* iid., ib. Nr. 9, p. 2; *(18)* iid., ib. 1896 Nr. 2, p. 8; *(19)* Grant, Ibis 1895, 466; *(20)* Hartert, Nov. Zool. 1896, 160.

c. **Psittacus spatuliger**, mas. *(I)* Bourjot, Perr. 1837—38, pl. 53.

d. **Prioniturus wallacei** Gld., MS.; *(1)* Gray, List Psitt. B. M. 1859, 18; *(2)* Schl., Dierent. 1864, 70.

e. **Prioniturus setarius** *(1)* Sclat., P. Z. S. 1860, 223, 226; *(II)* Gld., B. Asia, VI, pl. 12 (1862); *(3)* Wall., P. Z. S. 1864, 284, 293.

f. **Eclectus platurus** *(1)* Schl., Mus. P.-B. Psitt. 1864, 45; *(2)* id., Rev. Psitt. 1874, 22.

g. **Pionias platurus** *(1)* Finsch, Papag. 1868, II, 395.

"Kring-kring", Minahassa, Rosenb. *g 1.*

"Ili-ili", Gorontalo, Rosenb. *g 1.*

"Kulli-kulli" or **"Kelik-kelik"** (Nat. Coll.), Minahassa, Meyer 7.

"Cacatua birotti", Malay name, N. Celebes, Meyer 7, Guillem. *11.*

"Bawan buzar", Tjamba, S. Celebes, Platen *12.*

"Kelean", Tonkean, E. Celebes, Nat. Coll.

"Tulik", Peling and Banggai, Nat. Coll.

"Urili", Talaut Islands, Nat. Coll.

"Kulili", Siao, Nat. Coll.

For further synonymy and references see Salvadori *15.*

Figures and descriptions. Gould *e 2*; Temminck *b I*; Bourjot *c I*; Reichenow *IX*; Meyer *X* (skeleton); Sclater *e 1*; Finsch *g 1*; Salvadori *4*, *15*; Brüggemann *5*; W. Blasius *12.*

Adult male. Head, neck and under surface yellowish parrot-green, the yellow predominant on the under tail-coverts; on crown a spot of poppy-red; occiput lilac; feathers of lower neck above interscapular region tipped with deep orange, forming a collar; wing-coverts greyish pea-green, the lesser series lilac; rest of upper surface dull parrot-green, almost grey-green on mantle and scapulars, tertiaries margined with yellow, lower back touched up with lilac; tail-feathers except the 2 middle ones dark blue for the terminal 2,5 cm; the two middle tail-feathers green, the shafts produced naked for 40—55 mm beyond the rest of the tail, but having both webs left at the tip, forming a small pear-shaped spatule dark blue, green towards its base; quills and tail below verditer blue, changing to beryl-green according to the light, the former black near the shafts, which are themselves black (Minahassa — Nr. 1942). Iris dark brown; feet greyish blue, claws grey; bill bluish grey or whitish (N. Celebes — Meyer 7): iris brown; cere black; bill horn-grey black; feet lead-grey (Tjamba — Platen *12*).

Adult female. Above entirely dark parrot-green; below yellow-green, inclining to orange on the tips of the under tail-coverts; tail as in the male, but the bare shafts (21 mm) of the rackets shorter (Nr. 3983).

Young male (of 2nd year ?). Wants the red spot on the crown, the yellow-green of the hind-neck and orange collar of the adult male; the two middle tail-feathers only about

15 mm longer than the others, the webs of the projecting portion much narrowed, but not formed into rackets. This specimen is an abnormal one, apparently; on the left side of the head, the lores, superciliary region, ear-coverts and cheeks are lilac, like the occiput, on the right side the same parts are parrot-green; some of the lilac colour also appears on the left side of the lower neck, but not on the right (Manado — Nr. 6089). In a nearly adult specimen (Nr. 6088) a little lilac appears on the right ear-coverts, but not on the left.

Young (of 1st year ?). Like female, but the two middle tail-feathers only projecting as much narrowed tips about 10 mm beyond the others; the blue terminal portion of the other tail-feathers less broad than in the adult; rump, upper tail-coverts and the basal part of the tail-feathers on the right side strongly washed with greyish blue (N. Celebes — Nr. 6090). Feet blue-grey (Platen *12*).

These 2 young dresses may perhaps point to a tendency in young birds to develop blue tints.

Variation. We have paid much attention to the geographical variation of this species, with the usual result in such cases — that of discovering how little we really know about it. The bird certainly varies locally to a considerable extent, but its division into subspecies should be left to the future and not undertaken by the uninitiated, among whom we include ourselves. In certain localities it is possible to point to some differences:

1. Mainland of Celebes.

In adult males the occipital patch is lilac or light grey-blue, the broad green cervical collar is strongly stained with orange on the mantle, the racket-feathers (differing greatly with age) are long-shafted and comparatively large-headed; lesser wing-coverts at the carpal bend washed with the lilac of the occiput. Measurements: wing 170—192 mm [1]); tarsus 19; tail (without the rackets) 80—100; culmen from cere 21—23.

2. Peling and Banggai Islands.

Adult males from these islands have the patch on the occiput and carpal bend of a somewhat brighter and clearer blue (less grey) than on the mainland of Celebes; the lower half of the cervical collar is deep orange; the rackets are small, the shafts thereof comparatively short, the size is small: wing in 5 adult males 167—176 mm.

3. Eastern Peninsula, Celebes.

Two adult males from here take a somewhat intermediate position between the Peling form and that of N. & S. Celebes, though on the whole being more like the latter. Their size is rather small: wing 166, 171 mm.

4. Lembeh Island.

Two adult males from this island, close to the coast of N. Celebes, have the occipital patch and carpal bend somewhat brighter blue than in our mainland birds, and the collar above the mantle purer orange. The orange part of the collar is less bright than in the Peling form, the back is greener and less grey, the rackets are larger. Wing 176, 186 mm.

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[1]) This represents the extremes of size in 24 specimens. The females do not appear to be smaller than the males.

5. Talaut Islands.

Adult males from this group have the patch on the occiput and carpal bend light bright blue (Cambridge or flax-flower blue — Ridgway IX, 14), purer even than in the Peling form, and this tint is a good deal more extended on the lesser wing-coverts near the carpus; cervical collar above the mantle deep orange; size rather large: wing in 14 examples of different sex and ages 177—194 mm.

6. Sangi.

The locality is recorded by Brüggemann *(5)* alone; he describes the collar as purer green, with the yellow part over the mantle brighter than in birds from Celebes, the size large: wing ca. 190 mm.

7. Siao.

Schlegel *(f 2)* considered the collar above the mantle to be brighter and the spot on the crown broader[1]) than in Celebesian males. There are two males in the Leyden Museum from Siao, examined by one of us; of these one certainly has a lighter and brighter collar than males from Celebes, the other — perhaps not fully coloured — is like the latter. Three young specimens from Siao in the Dresden Museum measure: wing 172—187 mm.

Skeleton.

Length of cranium	50.0 mm	Length of tibia	51.0 mm
Greatest breadth of cranium .	28.0 »	Length of tarso-metatarsus . .	19.0 »
Length of humerus	42.0 »	Length of sternum	48.0 »
Length of ulna	51.0 »	Greatest breadth of sternum .	27.5 »
Length of radius	50.0 »	Height of crista sterni . . .	16.0 »
Length of manus	54.0 »	Length of pelvis	54.0 »
Length of femur	36.0 »	Greatest breadth of pelvis . .	28.0 »

Distribution. Celebes and the neighbouring islands: Minahassa (Wallace *2, e 3, 15*, Meyer *7*, etc.); Gorontalo District (Rosenb. *f 2*, v. Duivenb. *f 2*, Meyer *7*); Togian Is. (Meyer *7*); Lembeh Islands (Nat. Coll.); Kandari, S. E. Celebes (Beccari *4*); Buton S. Müll. *b 2, f 1*); S. Peninsula (Wallace *2, e 3, 15*, Platen *12*, etc.). — Siao, Sangi Is. (v. Duivenb. *f 2*, Nat. Coll.); (?) Sangi Islands (Fischer *5, 14*); Talaut — Karkellang Id. (Nat. Coll.); (?) Buru (Hoedt *f 2*); Peling and Banggai Is. (Nat. Coll.).

Schlegel records a young female of this species killed by Hoedt in the Bay of Bara on the North-east coast of Buru; we are unable to form an opinion as to this occurrence.

The Racket-tailed Parrots of the genus *Prioniturus* range from the Philippines, including Palawan and Sooloo to Celebes and possibly Buru. Nine distinct forms have been described, two or three of them being local races and only worthy of subspecific distinction. *P. platurus* may fairly be regarded as the most highly differentiated of the group. The adult male excels its compatriot in Celebes, *P. flavicans*, by having two patches of colour, a red and a lilac one on its green head, whereas the male *P. flavicans* has a blue head

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[1]) Varies with age, and the shape thereof depends much upon the manner of preparation of the skin.

above with a red patch thereon. *P. verticalis* Sharpe (Ibis 1894, 248, pl. VI), discovered by Everett in the Sooloo Islands, and *P. montanus* Grant (Ibis 1895, 466), discovered recently by Whitehead in the mountains of Luzon, are allies of *P. flavicans*. We take *P. platurus* for a highly-differentiated form of *P. luconensis* of Luzon, and *P. flavicans* as an offshoot of the other Philippine form represented by *P. discurus*. The young birds are all green, the adult *P. luconensis* is also all green, and it is therefore, we believe, of a more ancestral character than the adult male *P. platurus*.

The young of this species resemble the young of *flavicans* in coloration, but they may be readily distinguished by certain differences between the two forms pointed out by Sclater *(e 1)*, Brüggemann *(5)* and W. Blasius *(12)*:

	Prioniturus platurus	*Prioniturus flavicans*
Under tail-coverts:	Elongated; in adult as long as the rectrices, in young a little shorter.	Comparatively short.
Cere round nostrils:	Naked	Feathered.
Under bill: . . .	With a strong indentation on either side near the end, the cutting edge at the end projecting upwards.	The cutting edge much more even.
Colour of bill: . .	Horn-greyish blue	Horn-white. (Platen).

Prof. W. Blasius adds that *P. platurus* has a shorter but stouter upper bill, as well as its being of a different colour, but this statement we are unable to confirm from the specimens in the Dresden Museum, in which the upper mandible varies much in size. *P. platurus* is altogether rather the smaller bird.

The Racket-tail-feathers of *Prioniturus*, *Merops*, etc. present facts of interest to students of evolution, and they will be found discussed in our Introduction. (See figures thereof plates V, VI and VIII.)

According to Meyer *P. platurus* is solely an inhabitant of the low-lands and *P. flavicans* of the mountains of Celebes; but this view must be modified since Dr. Platen obtained both species in Rurukan at over 3000′ (Coll. Nehrk.) and the Drs. Sarasin both at Tomohon, *P. platurus* in April, *P. flavicans* at the end of May. They may, however, shift their ranges at different seasons.

"The bird flies much during the night, and can often be heard crying on the wing over one's head. It feeds in the night on the fruits of gardens and fields, and is fond of Indian corn, rice, and fruits like 'lansa' (*Lansium domesticum* Jack.), 'pakawa' (?), etc. During the daytime it is seldom to be met with in the plantations, but is to be seen flying very high and crying loud, seldom alone. It makes its nest in hollow trees. On trees it does not move much, but sits quietly. If one is shot down from a group the others do not stir, but lie, concealed by their green plumage, between the leaves, just as I have noticed in the case of other Parrots. The natives of the Minahassa assert that, if the 'kulli-kulli' is taken by surprise in the rice-fields, it becomes confused, or terrified, falls down, and then can easily be caught" (Meyer 7, and in Gould's Bds. of

N. Guinea pt. VI, 1878). Specimens in captivity in Europe were unknown to Dr. Russ *(a 2)*, and Dr. Platen failed to obtain living specimens *(13)*. S. Müller saw it in captivity in Buton *(b 2)* and Meyer once had a tame specimen at Manado, but it appeared to be very unhappy in its cage *(7)*.

* 44. PRIONITURUS FLAVICANS Cass.

White-billed Racket Parrot.

Plate VI.

Prioniturus flavicans *(1)* Cass., Pr. Acad. N. Sc. Philad. 1853, VI, 73; *(2)* Sclat., P. Z. S. 1860, 223, 226; *(III)* Gould, B. Asia VI, pl. 13 (1862); *(4)* Wall., P. Z. S. 1864, 284, 293; *(5)* Brüggem., Abh. Ver. Bremen 1876, V, 40; *(6)* Lenz, J. f. O. 1877, 363; *(7)* Meyer, Ibis 1879, 51, 145; *(8)* Rchnw., J. f. O. 1881, 255 (Consp. Psitt. 143); *(IX)* id., Vogelb. 1878—83, t. XXVII, f. 4; *(10)* Guillem., P. Z. S. 1885, 543; *(11)* W. Blas., Ztschr. ges. Orn. 1885, 212, 213—218; id., ib. 1886, 83; *(12)* Platen, Gefied. Welt 1887, 219, 231; *(13)* W. Blas., Ornis 1888, 560; *(14)* Salvad., Cat. B. XX, 1891, 416; *(15)* Sharpe, Ibis 1894, 248; *(16)* Grant, Ibis 1895, 466; *(17)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 5.

a. **Prioniturus discurus** *(1)* Wall. (nec. V.), Ibis 1860, 141.

b. **Eclectus flavicans** *(1)* Schl., Mus. P.-B. Psitt. 1864, 45; *(2)* id., Rev. Psitt. 1874, 23.

c. **Pionias flavicans** *(1)* Finsch, Papag. 1868, II, 399.

"Kulli-Kulli" and **"Cacutua birotti"** (Malay), Minahassa: — not distinguished by the natives from *P. platurus* (Meyer 7).

For further synonymy and references see Salvadori *14*.

Figures and descriptions. Gould *III*; Reichenow *IX*, 8; Sclater *2*; Brüggemann *5*; Lenz *6*; Schlegel *b 1*; Finsch *c 1*; W. Blasius *11*; Salvadori *14*.

Adult male. Parrot-green, darkest on the wings, lighter on the sides of head and face; breast ochraceous green washed with golden, deeper and brighter on the hind neck, forming a sort of collar; pileum cerulean blue; in the middle of it on the crown a large patch of poppy-red; abdomen, flanks and under tail-coverts yellower green than the back; under wing-coverts bright green; the two middle tail-feathers above green, bearing long rackets, with black spatules; the other tail-feathers green, black at the ends and on the inner webs; tail below glossy verditer blue, changing with the light to a brighter blue; wing below also verditer blue on the inner webs, black at the ends and near the shafts of the feathers; first primary edged with bluish green on the outer web above (C 11008 — Minahassa, Aug.—Sept.). "Iris grey-brown; bill horn-white; feet blue-grey" (Platen in Mus. Nehrkorn, Nr. 892).

Adult female. Like the male, but without the red spot on the crown, and the blue of the pileum less extended; the racket-feathers equally long (length of naked shaft with spatule 86 mm). (Minahassa, Aug.—Sept. — C 11009). Feet ash-grey (Platen in Mus. Nehrk.).

Young male (in second year?). Like the female, but the blue of the head less extended; one or two red feathers on the crown; the racket-feathers not yet properly formed, only 25 mm longer than the other rectrices, and the shaft narrowly webbed (Nr. 6085).

Younger. Only a little blue on head, the blue-tipped feathers with a few green ones intermixed (Nr. 6086).

First plumage. The young ones are quite green (Meyer 7).

Measurements. Wing 183—195 mm (14 specimens); tail 95—104 (without the rackets); tarsus 19; culmen from cere 22½—25.

Distribution. North Celebes, the Togian Islands and (?) the Sangi Islands. — Minahassa (Forsten *2*, *b 1*, Wallace *a 1*, Meyer *7*, *etc.*, Platen *12*); Banka Id. (Nat. Coll. in Dresd. Mus.); Lembeh Id. (Nat. Coll.); Gorontalo District — Limbotto (Meyer 7); Gorontalo (Riedel in Dresd. Mus.); Togian Islands (Meyer 7); (?) Sangi Islands (Brüggem. *5*).

Observation. Brüggemann *(5)* received a single specimen, marked "Sangir ♂", amongst 31 specimens from Dr. Fischer and Dr. Riedel. It presented some slight differences of coloration, though, as the author remarked, these might have been due to immaturity. Further evidence should be obtained before the Sangi Islands be admitted as a habitat of *P. flavicans* or of a local form of it. It would be a matter of no surprise if these islands or at least some of them should be found to harbour races of both *P. flavicans* and *platurus*.

That *P. flavicans* on the mainland has only been found in the northern Peninsula up to the present is remarkable.

This Racket-tailed Parrot is, to our mind, by no means so highly differentiated a species as *P. platurus*, and the nearest affinities of it and its near allies, *P. verticalis* Sharpe (Bull. B. O. C. 1893, X, Nov. 28) of the Sooloo Islands (similarly marked, but differing in the shades of red and blue on head and greenish on under surface) and *P. montanus* Grant of Luzon are not difficult to find. The female and immature male of *P. flavicans* differ from the adult *P. discurus* (Vieill.) — both male and female — of the Philippines in little, except that the Celebesian form is a good deal larger, the blue of the crown less pale, and the underside of the quills and tail paler and greener. The adult male of *Prioniturus flavicans* has the addition of a poppy-red patch on the crown of the head; it is therefore most likely that *P. flavicans* is derived from a form similar to *P. discurus* — or, rather, its ancestor — the adult male of which in Celebes has become larger and obtained the addition of a red patch on the head. This view appears to us more plausible than the converse hypothesis, that *P. discurus* is descended from *P. flavicans*, and that the adult male of it does not attain to its full development in the Philippines.

The genus *Prioniturus* has a very restricted range over the Philippines and the Celebes group exclusive as far as is known of Sula, though it may occur on Buru and in this case no doubt also on Sula.

The known forms from the Philippines, except perhaps *P. verticalis* and *montanus*, have a simpler, less specialized appearance than the two Celebesian ones. Over the greater part of the former occurs *P. discurus* (V.) and on Luzon *P. luconensis* Steere and *montanus* also, whereas Mindoro, Palawan and Sooloo have forms and species of their own: *P. mindorensis* Steere, *P. cyaniceps* Sharpe, *P. suluensis* W. Blas. and *P. verticalis* Sharpe, the two last on different islands of the Sooloo group. A better knowledge will perhaps prove that there are further differences amongst the specimens from the different islands of the Philippine group.

GENUS TANYGNATHUS Wagl.

This genus is always distinguishable from *Prioniturus* by its strongly graduated, almost wedge-shaped tail, as well as by its larger size and larger, broader bill. The colour is chiefly yellowish parrot-green, relieved on some of the upper parts by blue, occasionally by yellow and black, but no red, except on the bill, where it is found as a rule, though sometimes in the male alone. Wing below dusky, more shiny where it rests upon the body. There are four well distinguished species, of which some seven additional local forms have been described. Range: from the Philippines to Celebes and Sumba, through the Moluccas as far as N. W. New Guinea and the Tenimber Islands.

* 45. TANYGNATHUS MUELLERI (Müll. Schl.).

Celebesian Green Parrot.

This Parrot varies geographically in size. In Sangi, following a general rule there, the birds are very large, always exceeding the dimensions of those of the mainland of Celebes. In Talaut they are somewhat smaller, small individuals from there being occasionally, though very rarely, equalled or exceeded in size by large ones of Celebes, while large individuals are similar to Sangi birds. We prefer to group and label the forms as follows:

† 1. The typical Tanygnathus muelleri.

a. **? Psittacus sumatranus** *(1)* Raffl., Tr. Z. S. 1822, XIII, 281.

b. **Psittacus muelleri** Temm. in Mus. Leyd.; *(1)* M. et S., Verh. Natuurk. Comm. 1839—44, 108, 182 (Buton); S. Müll., Reiz. Ind. Archip. 1858, II, 69, 70; *(2)* Russ, Fremdl. Stubenvög. 1881, 452.

c. **Tanygnathus sumatranus** *(1)* Souancé, Icon. Perr. 1857, pl. 46; *(2)* Brüggem., Abh. Ver. Bremen 1876, V, 38.

d. **Tanygnathus muelleri** *(1)* Bp., Consp. Av. 1850, I, 5; *(II)* Souancé, Icon. Perr. 1857, pl. 45; *(3)* Wall., P. Z. S. 1864, 286, 294; *(4)* Wald., Tr. Z. S. 1872, VIII, 31 (pt. excl. Samar, Sangi); *(5)* Garrod, P. Z. S. 1874, 587; *(6)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 644; *(7)* Meyer, Ibis 1879, 47, 145; *(8)* Salvad., Orn. Pap. 1880, I, 135; *(9)* Krukenb., Vergl. physiol. Studien 1882, 213; *(10)* Rchnw., J. f. O. 1881, 245; Consp. Psitt. 1881, 133; *(XI)* id., Vogelb. 1878—83, t. XXVII, f. 9; *(XII)* Meyer, Vogelskel. 1883, t. XLV; *(13)* Guillem., P. Z. S. 1885, 542; *(14)* W. Blas., Ztschr. ges. Orn. 1885, 209; *(15)* id., Ornis, 1888, IV, 556; *(16)* Hickson, Nat. in N. Celebes 1889, 59, 86 (Talisse); *(17)* Salvad., Cat. B. XX, 1891, 430; *(18)* Büttik., Zool. Erg. Weber's Reise Ost-Ind. 1893, III, 273; *(19)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 5; *(20)* iid., ib. 1896, Nr. 2, p. 8; *(21)* Hartert, Nov. Zool. 1896, 160.

e. **? Psittacus leucorhynchus** *(1)* Reinw., Reiz. Ind. Archip. in 1821, 1858, 592 (Tondano).

f. **Tanygnathus albirostris** *(1)* Wall., P. Z. S. 1862, 336 (Celebes, Sula); 1864, 286, 294; *(2)* Sclat., P. Z. S. 1868, 262; 1871, 494; *(3)* Rchnw., J. f. O. 1881, 246; Consp. Psitt. 1881, 134; *(4)* Dallwitz, J. f. O. 1885, 103; *(5)* Guillem., P. Z. S. 1885, 543.

g. **Electus muelleri** *(1)* Schl., Mus. P.-B. Psitt. 1864, 48; *(2)* id., N. T. D. 1865, III, 185, pt.; *(3)* Finsch, Papag. 1868, II, 357; *(4)* id. et Conrad, Verh. z.-b. Ges. Wien 1873, 2, 14 (sep. copy); *(5)* Schl., Rev. Psitt. 1874, 25; *(6)* Lenz, J. f. O. 1877, 361; *(8)* Joest, Das Holontalo 1883, 106.

"Olia", Gorontalo, Joest *g 8.*

"Cacatua idiu", Malay name, Meyer *7.*

"Danga", Tjamba, S. Celebes, Platen *14.*

"Kaleak", Natives near Manado, Nat. Coll. in Mus. Dresd.

"Keja", **"Kejak"** or **"Keak"**, E. Celebes, Peling, and Banggai, Nat. Coll.

For further synonymy and references see Salvadori *d 17.*

Figures and descriptions. Souancé *d II, c I*; Reichenow *d XI*; Meyer *d XII* (skeleton); Finsch *g 3*; Brüggemann *c 2*; Salvadori *d 6, d 17*; W. Blasius *d 14.*

Adult male. Head, neck, mantle, scapulars, upper tail-coverts, and entire under parts yellow-green, brighter on the head; lower back and rump bright turquoise-blue; wings parrot-green, the lesser coverts and some of the inner median coverts margined broadly with blue, darker than that of the rump, the other wing-coverts and tertiaries margined with yellow-green; tail above parrot-green, yellowish at the tip; tail below golden olivaceous, shafts below white, above blackish; quills below shining brownish mouse-grey (Tjamba, S. Celebes, April 1878 — C 10423). "Iris light yellow; cere brownish; bill coral-red, point lighter; feet grey-brown (Platen). Another old male (Mus. Nehrkorn) labelled by Dr. Platen, Rurukan, has: "bill sealing-wax-red (lackrot); cere grey-black; feet yellow-brown."

Adult female. Like the male, but duller and greener; mantle and scapulars parrot-green like the wings; little or no trace of blue tips to the lesser wing-coverts (Limbotto — C 1904). "Iris light yellow; bill horn-white; cere grey-black; feet yellow-brown" (♀ Rurukan, Platen in Mus. Nehrkorn).

The female may be at once distinguished from the old male by its green mantle and scapulars, and white bill, though in some females (perhaps very old ones) this may assume a reddish colour.

Young male. Head duller darker green than in the female, otherwise like it; lower back and rump duller blue than in the old male. "Iris light yellow; cere brownish; bill light red; feet brown-grey" (Tjamba, 25th April, 1878 — Platen C 11206).

Measurements. Wing (34 specimens) 196—212 mm; tail 121, 137 (largest- and shortest-winged specimens); culmen from cere 30—34½; tarsus 19—21. Females as a rule are a trifle smaller than old males, and the bill is smaller.

Skeleton.

Length of cranium	62.0 mm	Length of tibia	56.0 mm
Greatest breadth of cranium .	34.4 »	Length of tarso-metatarsus .	19.0 »
Length of humerus	46.6 »	Length of sternum	50.2 »
Length of ulna	55.5 »	Greatest breadth of sternum .	32.2 »
Length of radius	52.0 »	Height of crista sterni . . .	15.7 »
Length of manus	59.0 »	Length of pelvis	60.7 »
Length of femur	39.6 »	Greatest breadth of pelvis .	28.7 »

Distribution. Buton (S. Müller *b 1*); S. W. Peninsula — Macassar (Wall. *d 3, d 17*, Conrad *g 4*), from Maros to Tanette (Meyer *d 7*, Weber *d 18*), Tjamba (Platen *d 14*); N. Peninsula — Minahassa (Forsten *g 1*, Wall. *d 3, d 17*, Rosenb. *g 5, etc.*), Gorontalo District (Rosenb. *g 5*, Meyer *d 7*), Lembeh Id. (Meyer), Talissi Id. (Guillem. *d 13*, Hickson *d 16*); Banka, Manado tua, and Mantehage Is. (Nat. Coll.); Togian Islands (Meyer *d 7*); S. shore of Gulf of Tomini — Posso and Todjo (Meyer *d 7*);

East Celebes (Nat. Coll.); Peling and Banggai (Nat. Coll.); Sula Islands — Sula Besi and Sula Mangoli (Allen *f 1*, *d 17*, Bernst. *g 5*, Hoedt *g 5*).

Observation. We are unable to find that this subspecies differs in North and South Celebes and Buton, and the Islands Banka, Manado tua and Mantehage off the Minahassa, the size is equal in all parts of the island; there is considerable difference in coloration between the old male and the female or young male, and old male specimens vary amongst themselves in the same locality (Manado), having the blue tint of the rump lighter or darker, etc.

† 2. Tanygnathus muelleri sangirensis M. & Wg.

h. **Eclectus muelleri,** partim, *(1)* Schl., N. T. D. 1865, III, 185.

i. **Tanygnathus muelleri,** partim, *(1)* Wald., Tr. Z. S. 1872, VIII, 31; *(2)* Salvad., Ann. Mus. Civ. Gen. 1876, IX, 53; *(3)* Rchnw., J. f. O. 1881, 245 (Consp. Psitt. 133); *(4)* Meyer, Isis 1884, 6; *(5)* W. Blas., Ornis 1888, 556; *(6)* Hickson, Nat. in N. Celebes 1889, 155; *(7)* Salvad., Cat. B. XX 1891, 431 (Sangi).

j. **Tanygnathus muelleri sangirensis** *(1)* M. & Wg., J. f. O. 1894, 113.

"Kakatua", Great Sangi, Nat. Coll. in Dresd. Mus.

Diagnosis. Like the *typical T. muelleri*, but much larger: wing 226—235 mm as against 205, the average size in Celebes.

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (C 12696) ad. [♂] Gr. Sangi, 21. VII. 93	226	143	23	33
b. (C 1184) imm. ♂ Gr. Sangi	235	145	24	35.5
c. (C 12695) [♀] Gr. Sangi 25. VII. 93	231	137	—	31
d. (Mus. Tring) [♀] Gr. Sangi 14. VII. 93	227	130	—	29.5
e. (C 1180) juv. Gr. Sangi	230	134	22	31

Distribution. Great Sangi (Meyer, Nat. Coll. and Leyd. Mus.).

3. Tanygnathus muelleri — sangirensis.

k. **Tanygnathus muelleri sangirensis** *(1)* M. & Wg., J. f. O. 1894, 239; *(2)* iid., Abh. Mus. Dresd. 1895 Nr. 9, p. 2.

"Areaä" or **"Area uwawi",** Talaut, Nat. Coll.

Diagnosis. Intermediate between the Celebes and Sangi forms.

Measurements. Wing (19 examples) 210—227 mm; tail c. 140 mm; culmen from cere c. 32 mm.

Distribution. Talaut Islands: Kabruang and Karkellang (Nat. Coll.).

Observation. There is, as a rule, more blue on the wing-coverts about the bend of the wing in Talaut and Sangi birds than in those of Celebes, but this character varies much in different individuals and with age.

It is curious that no form of *T. muelleri* has been found on Siao or the other islands between Celebes and Sangi. It can hardly be that the islands are too small to support two forms of *Tanygnathus*, *T. megalorhynchus* being there already, for Kabruang and Karkellang in the Talaut group are inhabited by three species of this genus, and the former island seems to be but little larger than Siao.

Müller's Green Parrot has two very close allies in *T. everetti*, Tweedd. of Samar, Panay and Mindanao, and *T. burbidgei* Sharpe of the Sooloo Islands.

These three species form a group, which stands nearer to *T. luconensis* (L.) of the Philippines than to the other members of the genus. *T. luconensis* differs chiefly by having the head above blue when adult. At first sight it appears as if a certain interest attaches to the fact that now and then young birds of *T. muelleri* show traces of a blue head; we have found this in a specimen from Sangi, in one from East Celebes, in one from Banggai. It may be a hint that the blue-headed form represents an earlier stage in the development of *T. muelleri*. But the young of the blue-headed *T. luconensis* has the head green and the bill red like the adult; it therefore seems to suggest that a form like *T. muelleri* was an early stage in the development of *T. luconensis!* It is just possible that two stages in the phylogenetic history of the race is betrayed by the young of the two species, but it seems quite unsafe as yet even to attempt to interpret the meaning of the facts.

The question of the significance of the red or white bill in this species — points which have led to its being split into two — must, we think, undoubtedly be answered according to the conclusion of Prof. W. Blasius — a conclusion at which indeed we had independently arrived from over 60 specimens examined — that the white-billed individuals are females or young males, the red-billed individuals are old males *(d 14)*. Occasionally females, as Brüggemann says, acquire a reddish bill *(c 2)*. In 1871, in order to solve the question whether the white- and red-billed Parrots were one and the same species or different ones, Meyer procured a very large series of specimens and came to the conclusion that the bill of the young bird is white, and gradually assumes a red colour as the bird grows older, and deep red with age; but it was not then known — as, indeed, it seems to have escaped ornithologists generally up to the present — that the female closely resembles the young. Dr. Hickson arrived at a somewhat different conclusion: "My boys and I shot a great many of these birds, partly to settle this vexed question and partly for food, and I found without exception that those with scarlet bills were males and those with white bills were females" *(d 16)*. We do not know whether Dr. Hickson was aware that the young male is like the female in coloration, but his observations taken together with those of Meyer and others of Dr. Platen made on the spot *(b 2)*, and of the Drs. Sarasin, and with the fact that in Zoological Gardens two or more cases are known of examples, which arrived with a white bill, but acquired a red bill subsequently (see Finsch *g 3*, W. Blasius *d 14*, Salvadori *d 17*), all serve to prove that females and young males have white bills (sometimes reddish), and old males red bills[1]).

Little is known of the habits of this Parrot. A living one, which was in

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[1]) A series of 37 specimens, collected in Aug.-Sept. 1892 for the Dresden Museum (though not sexed) vary as follows: 5 with the yellow-green seapulars and mantle of old males have the bill very deep crimson; 2 or 3 others with the yellow-green colour less strongly developed (younger males) have the bill red; 2 others, getting yellowish green on the shoulders, have the bill white (immature males); the remainder have generally a parrot-green back and white bill (females and young males).

Dr. Meyer's possession at Manado, fed on rice and bananas, and was generally unintelligent, idle, quiet, or grumbling *(d 7)*. In North Celebes the species is very common, and Dr. Hickson speaks of their resorting to the lower branches of the trees towards sunset, and keeping up a constant chattering noise until past midnight. Does it feed in the night like *Prioniturus platurus*? In South Celebes (Tjamba) it appears to be much rarer, as Dr. Platen's graphic description shows: "When one is on the watch in the woods of South Celebes, or passing through them as noiselessly as possible, Müller's Parrot, anxiously avoiding open places and keeping by preference in the darkness of the wood, may often be seen, usually alone, more rarely in twos or threes, as it flies past with its heavy flight and disappears apparently without leaving a trace in the crown of a thick-leaved tree. On remaining quiet and keeping the spot in sight, it is noticed, often not until after a lapse of half an hour or more, that the birds, which during this time have been sitting perfectly motionless and gazing at us, at last become lively and go about their daily duties, without however letting a sound be heard. In freedom they make the same quiet and serious impression as in captivity, never excite the attention of the hunter, but on the other hand contrive through motionless behaviour to be so deceptive that the eye passes them over without notice, even when such a bird is sitting openly on a bough. A single time my Malay hunter informed me as something remarkable, that he had seen a flight of six examples of this Parrot. As to its breeding, I could unfortunately learn nothing, for the nesting places are all to be found amongst inaccessible steep cliffs, and besides the natives show no interest whatever in capturing and rearing such birds" *(b 2)*.

†46. ? TANYGNATHUS LUCONENSIS (L.).

Blue-headed Green Parrot.

a. **Psittacus lucionensis** Linn., S. N. 1766, I, 146 (ex Brisson).

b. **Eclectus luconensis** *(1)* Finsch, Papag. 1868, II, 362.

c. **Tanygnathus luzonensis** *(1)* Brüggem., Abh. Ver. Bremen, 1876, V, 38; *(2)* Koch, Verz. Vogelb. aus Cel. u. Sanghir, Febr. 1876, 1; *(3)* Salvad., Ann. Mus. Civ. Gen. 1876, IX, 53.

Tanygnathus luconensis *(1)* Sclat., P. Z. S. 1871, 479; *(2)* Meyer, Isis 1884, 6; *(3)* Salvad., Cat. B. XX, 1891, 424.

d. **Tanygnathus lucionensis** *(1)* W. Blas., Ornis 1888, IV, 559.

For synonymy and references see Salvadori *3*.

Adult male. Parrot-green, yellower below and on hind neck, mantle and upper tail-coverts; crown and occiput light cerulean-blue; feathers of the lower back tipped with paler (turquoise-) blue; wing-coverts blue, broadly bordered with dark golden ochraceous, the greater series green, with terminal part blue and light green and yellow-brown margins, the primary coverts without these margins, the least series (bend of wing) black, tipped with blue and golden ochraceous; wings below shining dusky; tail below yellow shaded with olive (Bataan, Luzon — Nr. 3993). Wing 190; tail 124; tarsus 19; culmen from cere 31 mm.

Young male. Like the adult, but with only a trace of blue on the head; the mantle parrot-green; the back darker blue, which colour is much more extended; the wing-coverts dark parrot-green, — darkest at the edge of the wing, — bordered with dark golden-ochraceous (Luzon — Nr. 3988).

Distribution. "Philippine Islands including Palawan and Mantanani (small island to the North-west of Borneo) and also the Sooloo Islands" (Salvad. *c 3*); Sangi (Fischer *1*).

Observation. This species is included in the avifauna of the Celebesian province in virtue of six specimens in the Darmstadt Museum labelled by Dr. Fischer as coming from the Sangi Islands — most likely Great Sangi — and recorded by Brüggemann. Like Prof. W. Blasius we see no reason why the indication Sangi should be considered as possibly erroneous, though confirmatory evidence of the occurrence of this widely-spread species, or a local race of it, in Great Sangi — where it was not obtained by Hoedt, v. Rosenberg, van Duivenbode, Meyer, Bruijn, nor Platen — would be welcome.

This species varies a good deal in size, specimens from the Sooloo Islands and Talaut being the largest yet recorded. They also vary in coloration: the two specimens described above from Luzon — especially the young one — have the blue on the back well developed; in three from Cebu (adult and young) this part is parrot-green without any blue; one from Palawan (♂ juv.) has only a slight trace of blue; in two from Mindanao (♂, ♀, immature) it is better developed, though not so strongly as in the Luzon specimens, from which they further differ slightly in other points. Brüggemann's Sangi specimens have "the hind part of head scarcely washed with bluish; rump sea-blue; lesser wing-coverts blackish green with light green borders, the greater ones dark green bordered with greenish yellow. Wing 187—195; tail 119—127 mm. From the above series (of six), which contains different degrees of age, it may be seen that the blue on the head increases in intensity and extent with age, while the same colour on the rump disappears more and more, and at last (through attrition of the feathers [!]) becomes quite lost" *(1)*.

The Sangi birds seem from the description to correspond with those of Talaut, as far as the intense blue of the head and pure green back of fully adult birds is concerned.

Only a large series of specimens from all the different islands can prove whether these differences of coloration are bound to the locality.

† * 47. TANYGNATHUS TALAUTENSIS M. & Wg.

Talautese Blue-headed Green Parrot.

a. **Tanygnathus luzonensis** (nec Linn.) *(1)* M. & Wg., J. f. O. 1894, 239.
Tanygnathus talautensis *(1)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 9, p. 2.
"Area rusipang", Karkellang, Nat. Coll.

Diagnosis. Similar to *T. luconensis* but larger, the head above and ear-coverts cerulean-blue, sharply cut off from the olivaceous yellow of the neck, becoming green on forehead and loral region; malar region washed with blue (ad. Karkellang — C 13766, type of species; and others).

Young. The occiput only washed with blue; the wing-coverts green, scarcely any blue showing, the green-yellow edgings lighter than in the adult, the carpal region green, not black (Karkellang — C 15265).

Measurements. (20 specimens not including young ones) wing 202—222 mm, average 210—215; tail 115—142; bill from cere c. 33.5—39; tarsus c. 20.

Distribution. Talaut Islands — Kabruang and Karkellang (Nat. Coll.).

Observation. This species is a large and handsome local race of the Blue-headed Green Parrot, *T. luconensis*, of the Philippines from which it is easily distinguishable, according to our experience by its much larger size and fine blue head. Philippine specimens measured by us have the wing 174—189 mm, but Salvadori (Cat. B. XX, 426) records the wing as being 190—201 mm. Specimens from Manila and Sooloo indeed evidently attain to the dimensions of average *T. talautensis*, as the wing of one from Sooloo is given by Salvadori as 211 mm, tail 132 mm, but we prefer not to make *T. talautensis* a subspecies, with these forms as the necessary connecting links, since we do not believe that Philippine birds ever acquire such a blue head as those of Talaut. Possibly the Sangi birds mentioned in the preceding article will be found to affect this question.

+ 48. TANYGNATHUS MEGALORHYNCHUS (Bodd.).

Big-billed Green Parrot.

Under several forms this bird ranges from Talaut to the Moluccas, Sumba, Timorlaut, and New Guinea. In the Southern Moluccas and in Timorlaut, respectively, the birds have been struck off as species, *T. affinis* Wall. and *T. subaffinis* Sclat. The rest have been called *T. megalorhynchus* by Salvadori, but the Sumba birds were separated as a subspecies by Meyer. Those from Djampea seem to be intermediate. There seem to be other local variations, as well as much individual variation, but the question demands greater study than we feel disposed to devote to it, and the following method of nomenclature will answer our purpose.

1. The typical Tanygnathus megalorhynchus.

a. **Psittacus megalorhynchos** *(1)* Bodd., Tabl. Pl. Enl. 1783, 45.

b. **Perroquet à bec couleur de sang,** *(I)* Levaill., Perr. 1805, pl. 83.

c. **Psittacus macrorhynchus** *(1)* Gm., S. N. 1788, I, 338; *(II)* Shaw, Gen. Zool. 1811, VIII, 2, p. 530, pl. 79; *(3)* Reinw., Reis. n. Ind. Archip. in 1821, 1858, 592.

d. **Tanygnathus megalorhynchus** *(1)* Wall., P. Z. S. 1864, 285, 294; *(2)* Meyer, J. f. O. 1873, 405; *(3)* Brüggem., Abh. Ver. Bremen 1876, V, 37; *(4)* Salvad., Ann. Mus. Civ. Gen. 1876, IX, 52; *(5)* Meyer, Rowl. Orn. Misc. 1878, III, 127; *(6)* id., Ibis 1879, 48; *(7)* Salvad., Orn. Pap. 1880, I, 129; Agg. I, 1889, 30; *(VIII)* Rchnw., Vogelb. 1878—83, t. XI, f. 6; *(9)* Meyer, Verh. z.-b. Ges. Wien 1881, 762; Isis 1884, 6; *(10)* W. Blas., Ornis 1888, IV, 557; *(11)* Hickson, Nat. in N. Celebes 1889, 158; *(12)* Salvad., Cat. B. XX, 1891, 426.

e. **Eclectus megalorhynchus** *(1)* Schl., N. T. D. 1866, III, 184; *(2)* Finsch, Papag. II, 1868, 351; *(3)* Schl., Rev. Psitt. 1874, 23 pt.

"Kalea", Sangi Islands, v. Rosenb. *e 2.*

"Karea", Gt. Sangi and Siao, Nat. Coll. in Dresd. Mus.

For further synonymy and references see Salvadori *d 12.*

Figures and descriptions. Levaillant *b 1*; Shaw *c II*; Reichenow *d VIII*; Finsch *e 2*; Salvadori *d 7*, *d 12*; W. Blasius *d 10.*

Male. Head, neck, and sides of breast yellow parrot-green; sides and under wing-coverts deep yellow, the greater series sulphur-yellow with dusky bases; rest of

under surface of body greenish yellow; wings above dark blue, the lesser coverts, the smaller scapulars adjoining them, and some of the middle and greater coverts furthest from the edge of the wing, black; some of the lesser coverts and the scapulars broadly tipped with blue, the middle and greater coverts broadly bordered with deep yellow, the terminal part of some of the primaries green, the tertiaries green bordered with yellow-green, the longer scapulars green with a black spot surrounded by blue about the end of the shaft; quills below shining brownish smoke-grey; lower back and rump turquoise-blue; upper tail-coverts yellow apple-green; tail parrot-green, yellowish at tip; below golden, shaded with olive (Tabukan, Sangi, Nr. 13268).

"Iris light yellow; bill sealing-wax red; feet grey-greenish" (Platen *d 10*).

Female. Has the bill smaller than the male (Salvad. *d 12*); feet grey-green *(d 10)*.

Young. Has the scapulars and upper wing-coverts not so black and more greenish, and the yellow edges of the same paler (Salvad. *d 12*).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (Nr. 13268) ♂ Sangi	255	147	23	50
b. (C 12693) ad. Gr. Sangi, 23. VII. 93	266	165	—	51
c. (C 12692) imm. Gr. Sangi, 18. VII. 93	248	152	—	49.5
d. (C 12694) ad. Gr. Sangi, 17. VII. 93	248	153	—	46
e. (Mus. Tring) ad. Gr. Sangi, 26. VII. 93	255	160	—	46
f. (Mus. Tring) ad. Gr. Sangi, 25. VII. 93	244	142	—	45.5
g. (C 12589) ad. Siao, 6. VII. 93	255	160	—	50
h. (C 12590) juv. Siao, 8. VII. 93	247	158	—	45
i. (Mus. Tring) ad. Siao, 4. VII. 93	255	160	—	44.5
k. (Mus. Tring) ad. Siao, 5. VII. 93	239	146	—	44
l. (Mus. Tring) ad. Siao, 7. VII. 93	244	158	—	48
m. (C 13431) ad. Tagulandang, 1. VIII. 94	262	162	—	51
n. (C 13432) juv. Tagulandang, 7. VIII. 94	244	150	—	42
o. (C 13435) ad. Gunungapi, Tagulandang, 25. VIII. 94.	256	150	—	51
p. (C 13434) ad. Gunungapi, Tagulandang, 27. VIII. 94.	257	160	—	49
q. (C 13433) ad. Biarro, 4. IX. 94	252	150	—	50
r. (Mus. Tring) [♂] Mantehage, IV. 93	250	150	20	46
s. (C 12265) [♀] Mantehage, 27. IV. 93	250	145	24	43
t. (Nr. 13266) ♂ Manado, Celebes	245	145	23	54
u. (Nr. 13267) (♀?) Manado, Celebes	236	143	—	46.5
v. (Nr. 1949) (♀?) New Guinea	245	149	21	43
w. (Nr. 3436) (♀?) Moluccas	237	145	20.5	45

8 specimens from Talaut (Kabruang and Karkellang) measure: wing 229—259; tail 130—155; bill from cere 43—53 mm.

Distribution. North Celebes — (?)Manado (v. Musschenbroek *d 9*), (?)Tondano (Reinwardt *c 3*); Mantehage or Mantrau Id. near Manado (Meyer *d 5*, *d 6*, Nat. Coll.); Biarro and Tagulandang (Nat. Coll.); Sangi Islands — Siao (Hoedt *e 3*, Nat. Coll.); Great Sangi (Wall. *d 1*, Rosenb. *e 3*, Hoedt *e 3*, Meyer, Fischer *d 3*, Bruijn *d 4*, Platen *d 10*, Nat. Coll.); Talaut Islands — Saha (Hickson *d 11*); Karkellang and Kabruang (Nat. Coll.); Halmahera Group — Halmahera, Obi, Moor, Tidore, Motir, Ternate, Batchian, Makian, Morotai, Weeda; Western Papuan Islands — Sorong, Mysol, Salvatti, Batanta, Waigiou, Guebeh; W. coast of N. New Guinea (Salvad. *d 7*, *d 12*).

2. Tanygnathus megalorhynchus sumbensis (Meyer).

f. **Tanygnathus megalorhynchus** var. **sumbensis** *(1)* Meyer, Verh. z.-b. Ges. Wien 1881, XXI, 762.

g. **Tanygnathus megalorhynchus** *(1)* Salvadori, Cat. B. XX, 1891, 428 footnote.

h. **Tanygnathus megalorhynchus sumbensis** *(1)* Hartert, Nov. Zool. 1896, 588.

Diagnosis. Under wing-coverts greenish yellow, instead of deep yellow; under surface greener than in the typical form.

Distribution. Sumba (Riedel *f 1*, Doherty *h 1*).

3. Tanygnathus megalorhynchus — sumbensis.

i. **Tanygnathus megalorhynchus** *(1)* Hartert, Nov. Zool. 1896, 176.

Diagnosis. Intermediate (C 15857—58).

Distribution. Djampea Island (Everett).

Observation. Mr. Hartert (*h 1*) considers these specimens more like the typical form, we more like *sumbensis*; probably an intermediate position will not be far wrong.

The first notice of the occurence of this Parrot in Celebes was made in 1821 by Reinwardt, who simply mentions that *Psittacus ornatus*, *Ps. macrorhynchos* (i. e. *megalorhynchus*) and *Ps. leucorhynchus* were the three species of Parrot met with by him at Lake Tondano, but he may have perhaps misnamed the red-billed *muelleri*: *macrorhynchos*. In 1871 it was found by Meyer on Mantehage, a small island north of Manado about $8^1/_2$ miles off the coast, — not in the Togian Islands as stated by Count Salvadori *(d 12)*. Again in 1879 two specimens were sent to the Dresden Museum from van Musschenbroek with the locality "Menado" attached in that gentleman's writing. In the Sangi Islands the species abounds *(d 5)*; it is also, according to Dr. Hickson, not uncommon in the Talaut Islands. As was remarked by Meyer in 1879, *T. megalorhynchus* appears to be a species which is extending its range.

The Sumba birds have all greenish yellow under wing-coverts, instead of deep yellow, by which means the two forms may most readily be distinguished; also the under surface is greener — not so decidedly yellow-green, as in specimens of the typical form. Seen from above the two forms are not to be distinguished.

T. megalorhynchus with its allies, *T. affinis* (Ceram group) and *subaffinis* (Timorlaut) forms a very well marked section of the genus *Tanygnathus*, with great bloated-looking red bills, inhabiting the Moluccas, some of the Papuan Islands, etc. *T. megalorhynchus* with its blue wings and strongly contrasted colours on the wing-coverts appears to be the most highly differentiated form of the three. The connection of this section with the other members of the genus appears to be through *T. affinis* of Buru etc. and *T. luconensis* of the Philippines. *T. luconensis*, though much smaller, has like the *megalorhynchus* group its bill red in both sexes and in the young (upper mandible red, lower orange in adult, according to Salvadori), and the coloration of the wings shows much similarity to *T. affinis*; the head of the adult *T. luconensis* is, however, blue or greyish

lilac. In immature specimens of *T. affinis* (Nrs. 3437, 3438), which are assuming the green head of maturity, considerable traces of blue may be seen on the crown. This appearence perhaps gives a hint that *T. luconensis* represents an earlier stage of development. The genus *Tanygnathus* has its chief centre in the Celebes-Philippine province.

GENUS LORICULUS Blyth.

Map VI.

The Lorikeets are of small size — from that of a Blue Tit to that of a Lark —, the general colour yellowish parrot-green, with the rump and upper tail-coverts always red (accept in *L. tener*); the tail is short, half the length of the wing, or less; the first three primaries longest and almost subequal; tail below and wing below (where it rests upon the body) verditer-blue; bill rather long, and not much hooked, longer than deep; the reversed toe nearly equal to the middle (third) one in length. 23 species and subspecies have been described, with a range from India as far as New Guinea and the New Britain group.

+ * 49. LORICULUS EXILIS Schl.

Green Lorikeet.

Loriculus exilis *(1)* Schl., Ned. Tdschr. Dierk. 1866, III, 185; *(2)* Wald., Tr. Z. S. 1872, VIII, 32; *(3)* Schl., Rev. Psitt. 1874, 60; *(IV)* Rowl., Orn. Misc. 1877, II, 243, pl. LIX; *(5)* Meyer, op. cit. 233, 244—247; *(6)* Rosenb., Malay. Archip. 1878, 274, 593; *(7)* Meyer, Ibis 1879, 52; *(VIII)* id., Vogelskel. 1882, t. XXII; *(9)* W. Blas., J. f. O. 1883, 134; *(10)* Guillem., P. Z. S. 1885, 544; *(11)* Salvad., Cat. B. XX, 1891, 521; *(12)* M. & Wg., Abh. Mus. Dresden 1896 Nr. 1, p. 4.

a. **Coryllis exilis** *(I)* Finsch, Papag. 1868, II, 729, pl. 5; *(1^{bis})* Frenzel, Mtschr. Ver. Schutze Vogelw. 1880, 8, 11, 22; *(II)* Rchnw., Vogelb. 1878—83, t. XV, f. 6; *(3)* id., J. f. O. 1881, 226 (Consp. Psitt. 114); *(4)* Platen, Gefied. Welt 1887, 206, 230.

b. **Psittacus exilis** *(1)* Russ, Fremdl. Stubenvög. 1881, III, 817.

"Tintis kitjil" (little Lorikeet), Malay name, Manado, Meyer 7.

Figures and descriptions. Rowley *IV*; Rchnw. *a II*; Meyer *VIII* (skeleton) *5*; Schlegel *1*; Finsch *a 1*; Guillemard *10*; Salvadori *11*.

Adult. Parrot-green, with a yellowish wash, the wings darker and duller; rump and upper tail-coverts, which reach to the end of the tail, poppy-red, the bases of the feathers yellow; tail above green, like the wings, the feathers — except the two middle ones — tipped with greenish yellow; under surface yellower green than the upper; on the middle of the throat a lengthened spot of poppy-red, the parts surrounding it washed with verditer-blue or beryl-green; under side of wings and tail bright verditer-blue, the outer webs and tips of the primaries and the inner webs near the shafts black, the least series of under wing-coverts green, the middle series blue washed with green (Manado, Nr. 14030). "♂: Eyes yellow; feet orange-yellow somewhat reddish; bill coral-red" (Meyer 7, Platen *a* 4). "♀: iris brownish" (Platen *a 4*).

Young. Without the red spot in the throat (Finsch): bill brownish yellow; feet and cere

yellowish; iris light brown (Platen *a 4*); another example ♂ juv.: bill orange-red, cere and feet yellow-brown, iris orange (Platen, Nehrkorn in lit.).

According to Dr. Guillemard *(10)* the female is without the red spot on the throat, though the two sexes of species were at first (after a specimen with a red throat-spot determined as ♀ by von Rosenberg) stated to be identical by Schlegel and Finsch. The five specimens in the Dresden Museum have all a red spot on the throat, but the sex is not marked, so that they do not help to decide what is the truth of the matter. A young male, sent by Platen to Mr. Nehrkorn, with an orange-red bill has no spot. Dr. Guillemard's birds may have been young females.

A specimen marked ♀ in the Sarasin Collection has a small spot of red on the throat.

Measurements.

	Wing	Tail	Tarsus	Culmen from cere
a. (Nr. 14030) Manado	69	31	8	7.5
b. (Nr. 1935) Manado	67	34	8.5	—
c. (Nr. 1742) Manado	67	31	8	7.5
d. (Nr. 14029) Manado	66	—	8.5	7.5
e. (C 1160) Manado	65	32	8	—
f. (Sarasin Coll.) ♀, Rurukan, 12. IV. 95	69	30	8.5	7

Skeleton.

	mas.	fem.			mas.	fem.	
Length of cranium	23.0	24.0	mm	Length of tibia	23.2	23.0	mm
Greatest breadth of do.	13.8	14.3	»	Length of tarso-metat.	7.8	7.7	»
Length of humerus	14.8	14.8	»	Length of sternum	21.5	22.0	»
Length of ulna	17.5	17.6	»	Greatest breadth of do.	12.7	12.4	»
Length of radius	16.2	15.9	»	Height of crista sterni	8.0	8.0	»
Length of manus	21.4	21.7	»	Length of pelvis	21.7	22.8	»
Length of femur	16.1	16.0	»	Greatest breadth of do.	11.4	11.5	»

Distribution. North Celebes — Tulabulo and Paguatt, Gorontalo Province (Rosenberg *1, 3, 6*); Manado, Minahassa (Meyer *2, 5, 7*, Guillem. *10*); Rurukan, Minahassa (Platen *a 4*, P. & F. Sarasin).

This minute Parrot ranks with *L. aurantiifrons* Schl. of Mysol and New Guinea as the smallest species of the genus *Loriculus*. It was first discovered by von Rosenberg, who obtained five specimens in a garden at Tulabulo, N. E. of Gorontalo in 1864. In 1871 it was found again by Meyer at Manado; in the month of March only a single pair was met with, but in May it suddenly appeared in large flocks, frequenting the mangrove bushes near the sea-shore, and about a hundred specimens were obtained by the natives with blowpipes. The contents of the stomachs of specimens examined appeared to be composed, as far as Meyer could make out, of the juices of flowers; but doubtless it eats fruits as well, as von Rosenberg states *(1)*, since no animal can live upon honey alone, from the fact that it contains no albumen (Marshall, Papag. 1889, 21). Some tame specimens belonging to Dr. Platen were fed on a soft milk food, consisting of finely powdered biscuit, flavoured with bananas or sugar water. The Ceylonese species *L. indicus* feeds on the juices of both fruits and flowers (Legge, 182). At Rurukan at a height of over 3000 ft. Dr. Platen appears to have found *L. exilis* in plenty, and he mentions that both this bird

and *L. stigmatus* breed twice a year, viz. in February and August, and always prefer the sugar palms, the dead lower leaf-stems of which offer them convenient nesting holes *(a 4)*. Like other members of the genus, *L. exilis* is of a very affectionate disposition, as was shown by Dr. Platen's tame specimens at Rurukan.

The nearest known ally of *L. exilis* is *L. flosculus* Wall. of Flores, which differs from the Celebes form, as Count Salvadori shows, in being larger (wing 76 mm), in having the nape tinged with orange, the tips of the tail-feathers yellowish, stained with red, and in wanting the area of verditer-green surrounding the red spot on the throat. The presence of this wash of verditer or beryl-green on the throat of *L. exilis* suggests a relationship with *L. vernalis* of India, a species which appears to have more ancestral, or fewer recent, characters than other members of the genus; and on the same part of the throat a bluish tint, much like that in *L. exilis*, is found in the male of *L. vernalis* and is, sometimes also apparent in the female; but in this species the red spot on the throat is not developed.

The genus is more specially considered under the heading, *L. stigmatus*.

In respect of its bill *L. exilis* is the most strongly differentiated form of its genus. The under mandible appears at first sight deformed, the edge of it is hollowed out at the sides, the terminal part is then sharply curved up and lengthened, fitting into the hollowed-out upper bill like an incisor tooth, which prevents the bill from shutting, and at each side a semicircular hole is formed. This construction of the bill is perhaps connected with some peculiarity in its feeding; the same formation is seen on a less pronounced scale in the black-billed *L. amabilis* of the Moluccas and *L. aurantiifrons* of New Guinea and in some of the other black-billed species, also in the orange-billed *L. pusillus* Gray of Java and in *L. flosculus* Wall. of Flores. The resemblance is strongest in the last case. The orange-billed species have in general the under mandible with a straight cutting edge.

+ * 50. LORICULUS CATAMENE Schl.

Sangi Lorikeet.

a. **Loriculus amabilis** (part.) Wald., P. Z. S. 1871, 333 (Sanghir); id., Tr. Z. S. 1872, VIII, 26 (Tweedd. Orn. Works 1881, 131).

Loriculus catamene *(1)* Schl., Ned. Tdschr. Dierk. 1871, IV, 7; *(2)* id., Rev. Psitt. 1874, 62; *(III)* Rowl., Orn. Misc. 1877, II, 236, pl. LVII (♂ juv., ♀); *(4)* Meyer, t. c. 233, 237; *(5)* id., Gefied. Welt 1887, 264; *(6)* W. Blas., Ornis 1888, IV, 560; *(7)* Salvad., Cat. B. XX, 1891, 537.

b. **Coryllis catamenia** *(1)* Rchnw., J. f. O. 1881, 230 (Consp. Psitt. 118); id., Vogelb. Nachtr. 1883, Nr. 52.

c. **Psittacus catamene** Russ, Fremdl. Stubenvög. 1881, 805.

d. **Coryllis catamene** *(1)* Platen, Gefied. Welt 1887, 263.

"Lusint", Great Sangi, Platen *d 1.*

"Lunsihi", Great Sangi, Nat. Coll.

Figures and descriptions. Rowley *III*; Schlegel *1*; Reichenow *b 1*; Platen *d 1*; W. Blasius *6*; Salvadori *7*.

Adult male. Bright parrot-green, lighter and washed with yellowish on the under surface; sinciput (a short cap), lower back, rump and upper tail-coverts (which extend beyond the tip of the tail) poppy-red; a spot of the same colour on the middle of the throat; under tail-coverts — longer than the tail — scarlet, the extreme edges of the feathers yellow-green; the exposed outer webs and ends of quills above green, the inner webs black; the inner webs, as far as they rest upon the sides of the body, bright verditer-blue, the external part of the feathers black; under wing-coverts varied with yellow-green and verditer-blue (Great Sangi: — Mus. Nehrkorn, Nr. 1299). "Iris yellow or orange-red; bill black; cere brownish yellow; feet yellow-orange or orange" (Platen *6*).

Adult female. Like the male, but the head all green, without the cap of poppy-red; the under tail-coverts yellow-green with scarlet intermixed (Great Sangi: — Mus. Nehrk., Nr. 1300). "Iris brown or light brown; bill black; cere brownish yellow; feet yellow-orange or orange" (Platen *6*).

Young male. Like the adult female; not a trace of red on the head; the under tail-coverts approaching those of the adult male in intensity of colour (W. Blasius *6*). Iris light brown; bill black.

Young female. In two young females the red throat-spot is much less developed than in the adult of both sexes; the upper tail-coverts red, the ends of them reaching far short of the tip of the tail; the under tail-coverts green-yellowish with rather broad reddish tips: in one with the shortest upper tail-coverts the bill is yellowish; in the other dark brown. Iris brown (W. Blasius *6*).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (Mus. Nehrk. 1299) ♂, Great Sangi	82	45	9	10
b. (Mus. Nehrk. 1300) ♀, Great Sangi	84	42	9	10
c. (Nr. 1740) ♀, Great Sangi	80	41	9	—
d. (C 12699) [♂] ad. Great Sangi, 15. VII. 93	85	43	9.5	11
e. (Mus. Tring) [♀] ad. Great Sangi, 17. VII. 93 . .	84	40	—	10
f. (C 12698) imm. Great Sangi, 17. VII. 93	83	38	—	10

Distribution. Great Sangi Island (Hoedt *1*, *III*, Meyer *4*, Platen *d 1*, *6*, Nat. Coll.).

This little Parrot is only known from the principal island of the Sangi Group, where it was first discovered in 1864 by Hoedt, who apparently only obtained one specimen, the type, an adult male. A few more were procured by Meyer in the year 1871. Dr. Platen, during his residence in the island in 1886—87, obtained a fair number of specimens, forwarding to Mr. Nehrkorn, to whom we are indebted for the loan of the two described, as many as thirteen carefully labelled examples, which are discussed by Prof. W. Blasius *(6)*; but the species according to Dr. Platen is not particularly plentiful. The nearest known ally of *L. catamene* may be seen in *L. amabilis* Wall. of Halmahera and Batchian, which corresponds with it in all the principal details of coloration and in having the upper tail-coverts in the adult bird longer than the tail. The

Sangi Lorikeet may be distinguished by its larger size and also by its scarlet under tail-coverts. These are, however, almost entirely yellow-green in the young, much as in *L. amabilis* both young and old; this species has the under tail-coverts of a uniform green. This might appear to indicate that *L. amabilis* represents an earlier race, which developed scarlet under tail-coverts in Sangi. But *L. amabilis* has also developed some red colouring in its plumage, and, indeed, in a place where it is not found in *L. catamene*, viz: on the metacarpal edge and in the females at the bases of the feathers of the forehead. Therefore, whoever would argue that one species is directly descended from the other, must admit that the red has become lost in one place and developed in another. It is possible that a species with red on both the metacarpus and under tail-coverts remains to be found, since there is a female specimen (apparently a cage-bird) in the British Museum, labelled Halmahera and doubtfully referred to *L. amabilis* by Count Salvadori, which has red on both of these parts. The question can be raised whether the male of the form from which *L. amabilis* developed, had a red cap or not. The fact that the young males of *L. stigmatus*, *quadricolor*, *sclateri*, and — in all probability — *amabilis*, acquire the red carpal edge and *L. catamene* the red under tail-coverts, at an earlier age than the red cap, which is never produced in *L. sclateri*, render the opinion plausible that the ancestral form of *L. amabilis* and *catamene* was without a red cap, and so was more like the *L. flosculus* and *exilis* of to-day. These species are marked as of an earlier development in our genealogical tree of the genus (p. 163), a position which receives further confirmation from the fact that the young female of *L. catamene* is known to have the under tail-coverts nearly all green, a spot of red on the throat and a yellowish bill (W. Blasius *6*), so corresponding in nearly every detail of coloration with the mature *L. exilis* and *flosculus*.

* 51. LORICULUS SCLATERI Wall.

Sula Lorikeet.

In Sula the birds of this species have a more orange, in Peling and Banggai a redder back, and the following nomenclature may be employed for these two races:

♀ 1. The typical Loriculus sclateri.

a. **Loriculus sclateri** *(1)* Wall., P. Z. S. 1862, 336; pl. XXXVIII; 1864, 287, 294; *(2)* Schl., Mus. P.-B. Psitt. 1864, 132; *(3)* id., Ned. Tdschr. Drk. 1866, III, 186; 1871, IV, 8; *(4)* Wald., Tr. Z. S. 1872, VIII, 32 (Orn. Works 1881, 136); *(5)* Schl., Rev. Psitt. 1874, 61; *(6)* Meyer, Rowl. Orn. Misc. 1877, II, 233, 251; id., Ibis 1879, 52; *(7)* Rosenb., Malay. Archip. 1878, 274; *(8)* Sclat., List Vert. An. 1883, 326; *(9)* Tristr., Cat. Coll. B. 1889, 76; *(10)* Salvad., Cat. B. XX, 1891, 533; *(11)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 2, p. 9.

b. **Coryllis sclateri** *(1)* Finsch, Papag. 1868, II, 697; *(1bis)* Frenzel, Mtsschr. Ver. Schtz.

Vogelw. 1880, 12, 23; *(2)* Rchnw., J. f. O. 1881, 230 (Consp. Psitt. 118); *(3)* id., Vogelb. Nachtr. 1883, Nr. 51.

c. **"Loriculus wallacei** G. R. Gray" (!), *(1)* Wald., Ann. & Mag. N. H. 1872, IX, 398, 399; id., Orn. Works 1881, 125.

Figure and descriptions. Wallace *a I*; Finsch *b 1*; Salvad. *a 10.*

Adult. Parrot-green, quills and tail darker, under surfaee lighter; mantle and back golden-orange, many feathers tipped with searlet-vermillion; rump and upper tail-eoverts bright dark poppy-red; a pateh on the throat and the metacarpal edge of the same colour; under wing-eoverts yellowish green washed with blue, the longer ones verditer-blue; tail below, inner webs of secondaries, and inner webs of primaries, as far as they rest upon the sides of the body, bright verditer-blue (Sula Besi — Teijsman 1877 — C 14519).

"Bill black; eere and base of the upper mandible yellow; feet yellow; iris yellow" (Wall. *a I*).

Young. Green eolour duller; the patch on the back is dull orange, throat-spot small, red; the carpal edge greenish yellow (Sula Besi — Teijsmann — C 14518).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (Nr. 1999) ad. ? Sula Islands	90	40	10	13
b. (Mus. Petersb.) ? Sula Islands	87	—	11	14
c. (C 14519) ad. Sula Besi	91	37	11	12
d. (C 14518) juv. Sula Besi	89	—	—	12.5

Distribution. Sula Besi in the Sula Islands (Allen *a I*, Bernstein *a 5*, Hoedt *a 5*, Teijsman); (?) Celebes — Bone and Negri lama, Gorontalo Province (Rosenberg *a 3*, *a 5*, *a 7*).

Observation. Sula Besi is, up to the present, the only island in the Sula group from which this form is known. There are now 25 speeimens in the Leyden Museum, many of which were obtained by Teijsman in 1877. Its apparent absenee from Sula Mangoli is surprising.

+ 2. Loriculus sclateri ruber M. & Wg.

Abh. Mus. Dresd. 1896, Nr. 2, p. 9.

"Sinsin" or **"Sinsing"** of the natives.

Diagnosis. Like the typical form, but the mantle deep scarlet, and the feathers of the forehead red, exeept at the tips; the red of the rump searlet like the mantle.

Size. Wing ea. 90 mm; tail 40; tarsus 12.5; bill from eere 11—12.

Distribution. Peling and Banggai (Nat. Coll.).

Observation. The young (and perhaps the females) are without red on the forehead and have but little red or orange on the mantle, but the green seems to be brighter than in the young from Sula Besi.

Mr. Büttikofer had the great kindness to eompare this form with the 25 specimens from Sula Besi in the Leyden Museum and found that it had more red on the forehead and mantle than the bulk of the speeimens from that island; one speeimen, however, which he sent us for eomparison was almost as red on the mantle as the new raee, though the tint thereof was more orange; a seeond specimen had red on the forehead, though less extensive than in adults from Peling and Banggai. There are a number of small intermediate islands between these and Sula, and it appears pretty certain that these will furnish birds whieh intergrade with both races.

L. sclateri is one of a little group of three local forms — *L. stigmatus* (S. Müll.) of Celebes, *L. quadricolor* (Wald.) of the Togian Islands and *L. sclateri* (Wall.) of Sula, Peling and Banggai; it is, therefore, perplexing to find two properly labelled specimens (with sex and dates when obtained) in the Leyden Museum stated to have been killed at Bone and Negri lama in North Celebes by von Rosenberg, and in the case of the second specimen on the very day when a specimen of *stigmatus* was obtained by him there *(5)*. The record of *L. sclateri* in Celebes is very probably due to specimens escaped from confinement, for the *Loriculi* are much valued by the natives as pets and transported from place to place. If not, we can only conclude, in view of the highly "local" character of *L. sclateri* and its allies, that the specimens in some way got mislabelled.

The nearest known ally of *L. sclateri* is *L. quadricolor* of the Togian Islands, from which the former differs chiefly in that the adult male has the head green, like that of the female, whereas the adult male of *L. quadricolor*, as also of *L. stigmatus*, *catamene* and *amabilis*, has the additional ornament of a red cap. The commencement (or a relic, as the case may be) of this red cap is indeed seen on the forehead of *L. sclateri ruber*, and sometimes to a small extent in the *typical* form. Mr. Wallace has indicated *(a I)* the base of the upper mandible as yellow, but this does not seem to be the case in adults, though the young have much of the bill yellow.

The yellow supposed to be at the base of the bill, and the absence of the red cap appear at first sight to entitle *L. sclateri* to be regarded as an earlier stage of development from which *L. quadricolor* and *stigmatus*, and thence, perhaps, also *L. amabilis* and *catamene* may have been differentiated. But much may be urged against such an assumption: it seems much more probable that *sclateri*, *quadricolor* and *stigmatus* were severally differentiated in Sula, Togian and Celebes from a form formerly spread over all three localities, and that in Togian and in Celebes and not in Sula the males acquired a red cap, in all cases undergoing the variation independently of one another. That such analogous variation may take place appears to be undeniable; thus *L. indicus* (Gm.) of Ceylon, a local form of the wide-spread *L. vernalis* of India to the Malay Peninsula, and *L. apicalis* Souancé of the southern Philippine Islands have both developed a very similar red crown, quite independently as far as can be seen.

In the genus *Loriculus* certain groups of species occur, and one such is what we call the *stigmatus*-group, consisting of *L. stigmatus*, *quadricolor* and *sclateri*, another is that formed by *L. catamene* and *amabilis*, another is presented by the birds inhabiting the Philippines. The *amabilis*-group has affinities with *L. exilis* of Celebes, as has been shown, by the shape of the bill and the tail-coverts prolonged beyond the tip of the tail. *L. exilis* has nothing to do with the Philippine species, but as is remarked elsewhere, with the more southern forms, *L. flosculus* of Flores and *L. pusillus* of Java, which share to a great extent its peculiarly shaped bill and lengthened tail-coverts. As to the *stigmatus*-group

it may not be apparent at first sight whether it links on to the *amabilis*-group and thence to *L. exilis* and the forms of Flores and Java, or on to the Philippine species. *L. bonapartei* Souancé of the Sooloo Islands comes most into question among the latter birds, for, though its allies have yellow bills, this form sometimes has a black bill (in the adult, as we believe), while the bills of others were indicated by Dr. Guillemard as "red", "brown-black", "brownish", "very dark yellow" and by Everett (Ibis 1893, 249) as "dull orange, clouded and tipped with black". These, we believe, are younger birds, since young specimens of *L. stigmatus*, *catamene* and *amabilis* are known to have yellowish bills, and we do not share the opinion, which Count Salvadori expresses (Ibis 1891, 48—51), that the labels of Dr. Guillemard's specimens are not correct. *L. bonapartei* has "a rather long bill, and the exact style of plumage of the red-billed *L. apicalis*. The blue cheeks of the female also betray its real affinities with *L. apicalis* and the other Philippine species".

The adult males of *L. amabilis* and of *L. bonapartei* both agree with the adult males of the *stigmatus*-group in having the bill black, a red patch on the throat and a red cap (absent in *L. sclateri*). But the key to the answer of the question, whether the *stigmatus*-group has its closest affinities with *L. amabilis* or with *L. bonapartei*, is to be found in the females. The females of the *stigmatus*-group have a red patch on the throat, no red on the crown and no blue on the sides of the face; the females of the *amabilis*-group likewise have a red patch on the throat, no red on the crown or blue on the face; the female of *L. bonapartei*, on the other hand, has a red crown and blue cheeks, but no red patch on the throat. There is thus an almost perfect parallelism in the coloration of both male and female of the *stigmatus*- and *amabilis*-groups, sex for sex, and this is further borne out by some points of similarity in the general pattern of plumage, such as the abruptly marked-off red cap of the males (absent in *sclateri*) and the red metacarpal edge (absent only in *L. catamene*); the bill also agrees best in these two groups. The evolution of the sexes of *L. bonapartei* is not on a parallel with that of the *stigmatus*-group; the males of the two groups agree, but the females do not. The fact should not be overlooked that the adult males of birds usually differ from the females in having some character, or characters, superadded to those of the female, as, for instance, the possession of an additional patch of colour, a crest, spurs, a song; in such cases the young of both sexes very frequently resemble the female, and the female here may be reasonably regarded as having retained the dress of an earlier stage in the history of the race, whereas the dress of the male has been further developed. This rule is well illustrated by the genus *Loriculus*, in which the immature males much resemble the old females, the quite young birds having a still simpler dress. We therefore look to the females of the *stigmatus*- and *amabilis*-groups for indications of the relations of these species and infer that they are sprung from a race with a red spot on the throat, but with no red cap. Such a race is seen in *L. exilis* of Celebes and in *L. flosculus* of Flores, and these

species — though, no doubt, somewhat changed — may perhaps be regarded as more ancient types.

* 52. LORICULUS QUADRICOLOR Tweedd.

Togian Lorikeet.

Loriculus quadricolor *(1)* Wald., Ann. & Mag. N. H. 1872, IX, 398; id., Tr. Z. S. 1872, VIII, 109 (Orn. Works, 1881, 125, 207); Meyer, J. f. O. 1873, 404; *(2)* id., Rowl. Orn. Misc. 1877, II, 233, 251, 252; *(3)* id., Ibis 1879, 52, 145, 146; *(IV)* Salvad., Cat. B. XX, 1891, 534.

a. **Coryllis quadricolor** *(1)* Rchnw., J. f. O. 1881, 231 (Consp. Psitt. 119); id., Vogelbild. 1883, 55.

Figures and descriptions. Salvadori *IV*; Walden *1*; Reichenow *a 1.*

Adult male. Like the adult *L. sclateri*, but with the addition of a scarlet sinciput; the interscapulars and back golden orange, without the orange-red tinge in the middle; the rump and upper tail-coverts of a darker red (ex Salvadori and Walden).

Adult female. Like the male, but without the scarlet sinciput; the feathers of the forehead probably with scarlet bases.

Young. Like the female, but with the metacarpal edge greenish yellow, instead of red.

A specimen in the Dresden Museum marked young male evidently corresponds well with one so labelled in the British Museum (specimen *c* of the Catalogue), but which Count Salvadori wrongly believes to be a nearly adult female (the bases of the feathers on the forehead being red) as in very many cases the young males correspond with the old females. This is the case with its nearest ally *L. stigmatus.*

Measurement. (Nr. 6031) ♂ juv. Togian Id. Wing 90, tail 41, tarsus 10, culmen from cere 11 mm.

Distribution. Togian Island, Togian group in the Gulf of Tomini (Meyer *1, 3*).

Only six specimens of this Parrot were collected by Meyer, three of which are in the British and one in the Dresden and the other two in the Berlin Museum. They were shot near the village of Togian on the chief island of the group in the Gulf of Tomini in the month of August, 1871. *L. quadricolor* is intermediate in coloration between *L. stigmatus* of Celebes and *L. sclateri* of Sula. The Banggai Peninsula, the eastern limb of the mainland of Celebes, jutting out between the Togian and Sula Islands, was pointed to by Meyer in 1877 as preserving the answer to the following problem: "It would be a very interesting point to ascertain which species lives there; for if it be *L. stigmatus*, the two allied forms *L. sclateri* and *L. quadricolor* will prove to be insular forms derived from a parent stock, *L. stigmatus*, both changed in a somewhat similar manner, perhaps through the same (say 'insular') conditions, but not quite in the same manner. If, on the other hand, the species which inhabits Banggai should prove to be not *L. stigmatus*, it would certainly be of interest to know whether it is *L. sclateri* or *L. quadricolor*, or (as is possible) a form which is intermediate between these two" *(2)*.

The collections from the Eastern Peninsula made by native hunters in 1895 for the Dresden Museum proved that *L. stigmatus* occurs there, and that therefore *L. quadricolor* and *sclateri* are insular forms, though perhaps not derived from *L. stigmatus* as it is at the present day.

* 53. LORICULUS STIGMATUS (Müll. Schl.).

Celebes Lorikeet.

a. **Psittacus (Psittacula) stigmatus** *(1)* Müll. & Schl., Verh. Natuurk. Comm. 1839—43, 182.

Loriculus stigmatus *(1)* Bp., Rev. Zool. 1854, 155; *(2)* Wall., P. Z. S. 1864, 287, 294; *(3)* Schl., Dierentuin, 1864, 70, fig.; *(4)* id., Mus. P.-B. Psitt. 1864, 131; *(5)* Wald., Tr. Z. S. 1872, VIII, 32; *(6)* Schl., Rev. Psitt. 1874, 60; *(7)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 645; *(8)* Brüggem., Abh. Ver. Bremen 1876, V, 41; *(IX)* Rowley, Orn. Misc. 1877, II, 254, pl. LX; *(10)* Meyer, t. c. remarks 233, 234, 250; *(11)* Lenz, J. f. O. 1877, 363; *(12)* Meyer, Ibis 1879, 51; *(13)* Guillem., P. Z. S. 1885, 543; *(14)* W. Blas., Ztschr. ges. Orn. 1885, 218; *(15)* Salvad., Cat. B. XX, 1891, 535; *(XVI)* Meyer, Vogelskel. 1892, pt. 18, 44, t. CLXX; *(17)* Büttik, Z. Erg. Weber's Reise Ost-Ind. 1893, III, 273; *(18)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 6; *(19)* iid., ib. 1896, Nr. 1, p. 7; *(20)* iid., ib. 1896, Nr. 2, p. 9; *(21)* Hartert, Nov. Zool. 1896, 160; *(22)* id., ib. 1897, 165.

b. **Nanodes stigmatus** *(1)* S. Müll., Reiz. Ind. Archip. 1858, pt. II, 69, 71.

c. **Coryllis stigmata** *(1)* Finsch, Papag. 1868, II, 694; *(1bis)* Frenzel, Mtsschr. Ver. Schtz. Vogelw. 1880, I, 10; *(II)* Rchnw., Vogelbild. 1878—83, t. XV, f. 7; *(3)* id., J. f. O. 1881, 231 (Consp. Psitt. 119); *(4)* Platen, Gefied. Welt 1887, 206, 230.

"Tindito", Gorontalo, v. Rosenb. *c 1*; Joest.

"Tintis (Meyer *12*) or **"Tientis"** (Guillem. *13*), Manado.

"Tintis", Tonkean, E. Celebes, Nat. Coll.

"Bawan kidjill", Tjamba, S. Celebes, Platen *14*.

For further synonymy and references see Salvadori *15*.

Figures and descriptions. Rowley *IX*; Reichenow *c II*; Meyer *XVI* (skeleton); Schlegel *3*; Finsch *c 1*; Brüggemann *8*; Meyer *10*; Lenz *11*; W. Blasius *14*; Salvadori *15*.

Adult male. Parrot-green, yellower green on the under surface, the interscapulary region with a slight tinge of orange; sinciput, a patch on the throat and the metacarpal edge bright poppy-red; rump and upper tail-coverts crimson, much darker than the cap, the basal part of the feathers yellowish green; under wing-coverts yellowish green, the greater series verditer-blue, quills and tail below verditer-blue, the ends and exposed outer part of the quills black (Nr. 1931 — North Celebes).

"Iris light yellow; bill black; cere and feet orange" (Platen *14*).

Adult female and immature male. Like the adult male, but without the red sinciput (Nr. 1932). In the old female and young male the feathers of the forehead sidewards as far as the neighbourhood of the eyes possess a red basal half, showing through plainly, so as to give the forehead a reddish colour (W. Blas. *14*). Iris of female brown (Platen *c 4*).

First plumage. Like the adult female, but without the red bases to the feathers of the forehead; throat without any red patch, a yellowish space occupying the spot where it appears later; carpal edge greenish yellow (Nr. 1933 — N. Celebes). A young one about a fortnight old was quite green, except its light yellow shoulder-edges; under parts lighter green; nape light orange-tinged; the red of the upper tail-coverts already perfect; bill yellow; feet yellowish brown (Meyer *10*).

Eggs. "The eggs collected by Dr. Platen at Rurukan, the most highly situated village in the Minahassa, are almost spherical and extremely thin-shelled. Measurements: 19×17 mm" (Nehrkorn MS.). Colour white.

Nest and breeding season. "Breeds twice a year, viz: in February and August, and always prefers the sugar-palm, the lower withered leaf-stems of which afford it convenient nest-holes; *Coryllis stigmatus* lines the nest-holes some centimeters high with shreds of leaves" (Platen *c 4*).

Measurements. Wing (14 specimens, N. Celebes) 93—100 mm; tail 40—45; tarsus 10—11.5; culmen from cere 11—11.5. The longest- and shortest-winged specimens (Nrs. 1931, 1741) are both adult males. A young yellow-billed specimen (Nr. 1933) is one of the largest, wing 98 mm.

Skeleton.

Length of cranium	33.8 mm	Length of tarso-metatarsus	11.5 mm
Greatest breadth of cranium	18.3 »	Length of digitus III	19.0 »
Length of humerus	22.4 »	Length of sternum	33.5 »
Length of ulna	25,6 »	Greatest breadth of sternum	20.0 »
Length of radius	23.4 »	Height of crista sterni	11.8 »
Length of manus	30.0 »	Length of coracoideum	18.8 »
Length of metacarpus	16.8 »	Length of scapula	24.0 »
Length of digitus princip.	13.3 »	Length of clavicula	12.0 »
Length of femur	22.5 »	Length of pelvis	30.5 »
Length of tibia	31.5 »	Greatest breadth of pelvis	18.0 »
Length of fibula	14.0 »		(Meyer *XVI*).

Distribution. Celebes, Minahassa (Forsten *a 1*, *4*, Wallace *2*, *15*, Rosenberg *6*, *etc.*); Lembeh, Mantehage and Banka Islands (Nat. Coll.); Gorontalo Province (Forsten *a 1*, *4*, Rosenb. *6*, Meyer *10*, *12*); Pagnatt, N. coast of Gulf of Tomini (Rosenb. *6*); Posso, S. coast of Gulf of Tomini (Meyer *10*, *12*); E. Celebes — Tonkean (Nat. Coll.) Macassar, S. Celebes (Wallace *2*, *15*); Tjamba, S. Celebes (Platen *14*); Luwu (Weber 17); Tawaya and Dongala, W. Celebes (Doherty *22*).

L. stigmatus has been found in most parts of the Northern Peninsula of Celebes as far as its base at Posso, and in the Eastern Peninsula; it has also been recorded from two or three spots in the South-western Peninsula, though Meyer remarked that it was less plentiful here than in the north *(10)*. In all probability, therefore, it exists in Central Celebes as well. It was not obtained in the south-eastern part at Kandari by Beccari, nor was it observed by the earlier travellers in Buton Island.

This Lorikeet is a common bird in North Celebes, ranging from the sea-coast high into the hills. Dr. Platen found it breeding at the village of Rurukan (over 3000 ft.). Meyer observed that it lived singly or in pairs, not in flocks; it is — like *Loriculus exilis*, *Trichoglossus ornatus* and *T. meyeri*, — not a strictly stationary bird, but in the habit of making local movements, regulated, no doubt, by the time of ripening of certain fruits. In the beginning of March, 1871, it was especially plentiful near Manado. It feeds on soft fruits, such as bananas and the like, and is therefore to be found in the plantations near the villages *(10)*. In captivity Dr. Platen found it ate readily canary-seed and biscuit, which *L. exilis* rejected until the food was bruised and made up into

a sort of pap with bananas or sugar-water. A tame bird of Meyer's when at Manado was very fond of tea.

The *Loriculi* according to Dr. Frenzel (see Mtsschr. des D. Vereins zum Schutze d. Vogelwelt 1880, No. 1, 15) are much superior to the other dwarf Parrots in intelligence. The above-mentioned example was taken very young and was in the possession of Meyer and his wife for a long time in Celebes, and evinced a great affection for the latter. "It followed my wife everywhere in the house, and did not rest till it was near her, then, without help, climbed up from the ground to her shoulder or her head. It loved best to take food from her mouth, and licked up tea from her lips. When we took our tea in the afternoon, and the little bird only heard the rattling of the cups, it became much excited, and did not rest until its cage was opened and it could come near the table; it then took the tea out of a small basin or a spoon. When in its cage, and my wife passed by, it clapped its wings till she let it out. When we left Manado for a fortnight on a boat-tour, . . . a neighbour reported that it had been melancholy all the time. When it saw my wife again, it became much excited; this I observed myself. Being placed in the same cage with the smaller *Loriculus exilis*, it always bit it; they could not remain together. But with the larger *Trichoglossus meyeri* it became anxious; nevertheless it attacked the bird as much as possible" (Meyer *10*). During a second and longer absence of Meyer and Mrs. Meyer from Manado, the bird, though properly cared for, died; it was reported to have cried incessantly, and at last was found dead. "The man in whose care it was, had seen and knew exactly how we had treated the bird; it therefore did not die on account of wrong or improper food, etc. I will not decide whether the explanation (of our neighbour) that it died from sorrow was the right one or not; at all events it was an amiable lovely bird for whose death we mourned. . . . But the case serves to show that even these small Parrots are very sagacious and attractive creatures" *(10)*. Although far exceeding the Dwarf Parrots *(Psittacula)* in trustfulness and affection for their owner, they do not possess the same inseparable attachment as these for one another; on the other hand, they are quarrelsome when together, and Dr. Frenzel mentions a case of a young male of *L. galgulus* belonging to Dr. Russ which bit an old male to death, while three in his own possession would not let one another eat in peace, so that separation was necessary, or two of them would have been starved (op. cit. p. 16).

The genus Loriculus.

Map VI.

In 1877 Meyer *(10)* gave a key showing the geographical distribution of the genus *Loriculus*. The accompanying key is based upon this, modified according to Salvadori's treatment of the genus and to recent discoveries.

The Geographical Distribution of the genus Loriculus.

	India and Burmah	Ceylon	Andamans	Malay Peninsula	Sumatra	Borneo	Java	Flores	Luzon	Negros, Panay	Samar, Leyte	Cebu	Mindoro	Siquijor	S. Philippines	Sooloo	Sangi	Celebes	Togian	Sula	Peling, Banggai	Halmahera, Batchian	Mysol	New Guinea	Fergusson Id.	Duke of York Id.
1. *L. vernalis*	*		*	*																						
2. *L. indicus*		*																								
3. *L. galgulus* [1]				*	*	*																				
4. *L. pusillus*							*																			
5. *L. flosculus*								*																		
6. *L. philippensis*									*																	
7. *L. regulus*										*																
8. *L. worcesteri*											*															
9. *L. chrysonotus*												*														
10. *L. mindorensis*													*													
11. *L. siquijorensis*														*												
12. *L. apicalis*															*											
13. *L. bonapartei*																*										
14. *L. catamene*																	*									
15. *L. exilis*																		*								
16. *L. stigmatus*																		*								
17. *L. quadricolor*																			*							
18. *L. sclateri*																				*						
19. —— *subsp. ruber*																					*					
20. *L. amabilis*																						*				
21. *L. aurantiifrons*																							*	*		
22. —— *subsp. meeki*																									*	
23. *L. tener*																										*

In a key showing the geographical distribution of the *Loriculi*, like the above, it is not possible to arrange all the species according to their nearest affinities, since the genus is composed of two main branches, each comprising about half of the species, but it is sufficient to show that the birds are spread almost without interruption from India throughout the East India Archipelago to New Guinea (South-east) and the Duke of York Island in the New Britain Group, continually presenting new forms as one proceeds from point to point across this area, and it is pretty certain that still more species are to be discovered here.

Did the genus arise in the Asiatic Continent and spread its range south-eastward to the Papuan Subregion, or did it proceed from New Guinea, where

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[1] Frenzel *(1 bis)* mentions a pair with blackish wings, which he supposes to be the sign of a local race, a supposition highly probable in consideration of the distribution of the species.

parrots abound, to India, or did it range in earlier times, when the whole was one mass of land, throughout the then Eastern Continent and was more or less differentiated, split into species, after the formation of the Archipelago?[1])

The conclusion seems unavoidable — and this remark is made after carrying the matter in mind for a period of about five years — that *Loriculus* (in some cases at least) extended its range by flight across the sea.

In addition to this we must state, as necessary to the following argument, that emigrants get altered more than stayers-at-home. It may in a certain sense be compared to the axiom of Euclid: "If unequals be added to equals, the wholes are unequal", the unequal condition in the zoological case being the new conditions of existence for the colonists.

Further, it may be stated that there is much reason to assume that the plumage of young birds is often ancestral in character. In proof of which it could hardly be possible to point to a better case than the racket tail-feathers of *Prioniturus*, which in the young clearly show an initiatory stage of development (see plates with figures and remarks thereon in our Introduction), and other good cases among Celebesian birds are the blue back in the immature *Pelargopsis melanorhynchus*, the traces of a yellow wing-band in the young *Trichoglossus meyeri*, the Kestrel-like plumage of the young of the Hawks *Accipiter rhodogaster* and *Spilospizias trinotatus*, the identical young plumage of the Hawk-eagle *Spizaetus lanceolatus* and the Honey-buzzard, *Pernis celebensis*. In many cases among birds the female shows a minor differentiation than the male, for instance, again, *Prioniturus*; very rarely a higher one *(Turnix)*. As Gadow remarks (Newton's Dict. B. 1893 p. 100): "Instances, too well known to be repeated here, show clearly how the changes of bygone ages of the ancestors are recapitulated in the yearly moult of the growing individual until with maturity its present stage of perfection is reached". The very utmost caution should, however, be used in making use of this principle, for all sorts of disturbing side-influences forbid of its acceptation as thorough-going: sometimes, for instance, as in some of the Kingfishers, the young display no differences from their parents, sometimes the differences seen in them seem to be of a special protective or other character rather than ancestral, sometimes the mother's influence preponderates though her characters may be more recent than those of the father (for instance, in the genus *Edoliisoma*), sometimes, when the male seems to be the less differentiated, the young take after him *(Turnix)*, sometimes the male young one is like the father, the female young one like the mother (for instance, *Monachalcyon*, *Cittura*, *Eclectus*). It is excessively difficult to form an opinion as to whether the dress of a young bird is ancestral in character or not; one feels justified in doing so only when the young throws back very plainly to some form which is existing to-day.

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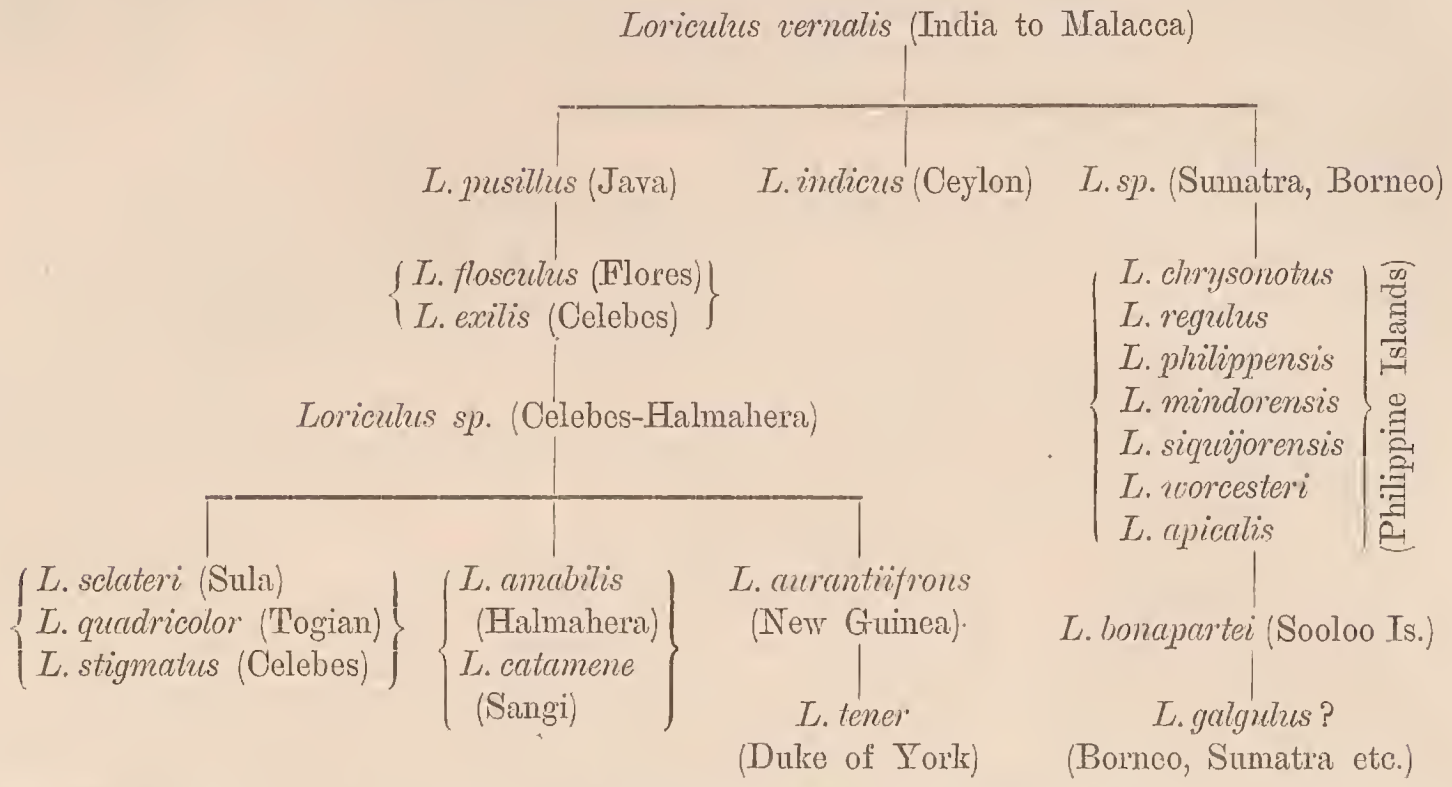
[1]) We do not take into consideration the possibility, that the genus spread out east and west from one of the central island groups, as there appear to be no indications for such a supposition.

This appears to occur in many cases in the genus *Loriculus* and affords a reason for the construction of the accompanying genealogical tree:



A glance at the above genealogical tree will show that *L. vernalis*, the "Stammform", to which we hypothetically trace the different species of the genus, is supposed to have given rise to two main branches, as well as to a brief offshoot, *L. indicus* of Ceylon, which has not been differentiated further. Hitherto, by several authors, the genus has been divided for practical purposes — as an aid to the determination of the species — into two groups, characterized by the possession of an orange-coloured or a black bill; but it would be an error to suppose that on this difference alone the genus can be divided into two natural groups. In the young of the black-billed *L. catamene*, *stigmatus*, *sclateri*, and *amabilis* the bill is known to be yellowish or whitish at first, in the black-billed *L. galgulus* it is dull yellow, shaded with dusky (Davison), and is stated by Guillemard to be "red", "very dark yellow" etc. in specimens of the black-billed *L. bonapartei*, a species in which we suspect the quite black bill to be present only in old birds. Furthermore, the black-billed *L. bonapartei* and probably *L. galgulus* are really as far removed as possible from the other black-billed species, and the former at all events should be placed at the extreme end of the other branch of the genealogical tree, notwithstanding the fact that there is a considerable resemblance between the adult males of *L. bonapartei* and *L. stigmatus*. The ontogenetic reasons on which this division of the genus rests are the following:

In addition to having a general colour of parrot-green, all the *Loriculi*, with one exception, possess a red rump and upper tail-coverts, a character assumed with the first plumage[1]), and which may, therefore, be regarded as of

[1]) The young *L. galgulus* has only the edges of the feathers red (Salvadori).

long standing. The exception is *L. tener* of Duke of York Island in the New Britain Group, in which the rump and upper tail-coverts are greenish yellow. The differences of plumage, which show that the genus is composed of two main branches originating in a form like *L. vernalis*, or even a form like the female of *L. vernalis*, which most likely represents a lower stage than the male adult, are the following:

The throat-spot. All the members of the left or, as we will call it, the southern branch of the genealogical tree possess a spot or patch of colour on the throat in one or both sexes, and in the higher forms even in the young. In the adult male of *L. vernalis* it is bluish (nearly or quite absent in the female); in *L. pusillus* of Java it is yellow (in the female, as in the male — according to Finsch; paler — according to Salvadori; absent — according to Reichenow), in *L. flosculus* and *exilis* it is red (whether present or absent in the female there is insufficient evidence to say); in the seven remaining species it is present as a red spot like that of *L. flosculus* in both male and female, and makes its appearance at an early age in the young, in the first plumage being sometimes, if not always, yellowish in colour.

In the species on the right or northern branch of the "tree" the throat-spot is always absent in the young and in the females; in the adult males alone it is developed as a final addition to their coloration in the form of an extensive patch of red on the throat.

In the male *L. galgulus* Dr. Frenzel observed from living examples that "first the blue spot on the crown shows itself, next the orange-coloured, triangular spot on the nape makes its appearance, and lastly the beautiful scarlet on the breast (and throat) appears; the change of coloration goes on very slowly and the bird is not in full dress till the third year" *(c 1 bis)*. But in the higher members of the southern branch the colour on the throat is among the first characters — not the last — to make its appearance. Since young specimens of *L. stigmatus*, *amabilis*, *sclateri*, and *catamene* with yellowish bills display it to some extent, it may prove to be present as yellow if not red in these birds from the time they leave the nest.

Thus, in the southern branch the throat-spot appears to be a somewhat ancient character, in the northern branch it appears to be the most recent acquisition of the adult male.

The coloration of the crown. The two groups again present a contrast in regard to the coloration of the crown. In the members of the left or southern branch, the females of all the species may broadly be said never to possess any special colouring on the head (in the females of *L. stigmatus*, *quadricolor*, *sclateri*, *amabilis* and *aurantiifrons* the green feathers of the forehead have reddish bases). In the adult males of the latter species (except *sclateri*) and in *L. catamene* a sharply defined red sinciput is produced (in *aurantiifrons* yellow); in the simpler species, *L. exilis*, *flosculus* (as far as known), *pusillus* and *vernalis* no sign of a red crown is to be seen in either sex, neither does it occur in

the immature males which gain it when adult; these resemble the females when young. It is the latest character to be assumed in the ontogenetic development of the male individual as it gradually acquires the markings of the perfect bird, and it would, therefore, appear that the red sinciput is the latest acquisition in the phylogenetic development of this branch of the species.

In the members of the right or northern branch of the tree the process is strongly contrasted with this. Not only do the males possess red on the crown (except *L. galgulus* in which there is a blue spot on the crown, but we have found some traces of red in a young specimen), but also the females (except, again, *L. galgulus*) have red crowns — sometimes confined to the fore part of the head, sometimes extended to the nape, — and the immature males generally — probably always — resemble the females. Only the very young birds are quite green on the head, so bearing much likeness to *L. vernalis*, female. In this group, therefore, one may conclude that the red crown is a character of rather long standing.

Ontogenetic and phylogenetic development. As may be gathered from the above, the development of the plumage of the two branches of the *Loriculi* starting in common with a first plumage of green with a red rump and upper tail-coverts, afterwards proceeds on two quite different lines. It is known that in *L. amabilis* and *stigmatus*, two most highly specialized species of the left branch of the genealogical tree, a yellowish or whitish beak and a yellowish spot on the throat is found in the quite young bird (in *stigmatus* first "light yellow and then orange-yellow", according to Brüggemann 8). A now-existing species with a yellow patch on the throat and a yellow bill is the simply coloured *L. pusillus* of Java, which therefore may be the not-much-changed ancestor of *L. amabilis* and *stigmatus* and its fellows. *L. amabilis* and *stigmatus* in the next stage of their immature development become like *L. flosculus* and *exilis*, in that the yellow spot changes into red, but the bill now or soon after loses its pale colour and becomes black, and the carpal edge and the bases of the feathers of the forehead show a red tinge; so that, though the young bird has still much in common with *L. exilis*, the parallelism in coloration is not perfect. The females do not develop their coloration beyond this stage, which is also the dress of the young males before they acquire the red sinciput, and the same characters are found in the females and immature males of four species — *L. stigmatus*, *quadricolor*, *sclateri* (the male of which never acquires a complete red cap) and *amabilis*. These considerations afford some ground for the supposition that these four species are descended from a common ancestor a good deal resembling the adult males of *L. flosculus* and *exilis* in coloration. The young female of *L. catamene* corresponds still more closely with *L. exilis* and *flosculus*.

The ontogeny of the plumage of the species of the northern branch of *Loriculus* proceeds by the young birds (*L. regulus*, *L. philippensis*) first of all

assuming a plumage not unlike that of the immature, or female, bird of *L. vernalis*. This young form in both sexes (as is known in, at least, four cases[1]) develops into a bird like the adult female of its species, viz., a bird with a red crown of greater or less extent, and blue cheeks and chin. As the male becomes adult, it loses the blue on the cheeks and chin, and the red on the head generally undergoes some change in extent and tint, and the extensive patch of red on the breast appears. All the females have a general likeness among themselves, and an immature male of one species before us, *L. apicalis* (Nr. 6012) corresponds remarkably well with the female of another, *L. chrysonotus* (Nr. 1739). There is, therefore, reason to suppose that the Philippine species, including *L. bonapartei* of Sooloo, are sprung from a common ancestor much like their females.

L. galgulus of Borneo, Bangka, Sumatra and the south part of Malacca is a very aberrant and puzzling form, differing in the adult male from the males of this branch in having a blue spot on the crown and no red there, and in the female from the females in wanting the blue on the face and red on the crown, yet it appears to belong to this branch of the *Loriculi* from the fact that the female has no red spot on the throat and that the male, like the Philippine males, develops a large patch of red here as a final adornment. We place it provisionally not far from *L. bonapartei*, in virtue of its black bill and that a young specimen from captivity and showing traces of xanthochroism before us offers one or two red feathers, tipped with greenish yellow, on the crown; but we doubt if further research will prove this position to be its true one.

The grounds given for regarding the *Loriculi* as consisting of two main branches — a left and a right one as shown in the above genealogical tree — may be briefly restated as follows:

Left (southern) branch:	Right (northern) branch:
1. The females of the more specialized black-billed forms have a spot of colour on the throat.	1. The females have no spot on the throat.
2. The males of the black-billed species assume the throat-spot at a very early age.	2. Young males have no spot on the throat; a large patch of colour here and on the chest is the last thing to make its appearance in the male plumage.
3. The females are without a red crown.	3. The females possess a red crown.
4. In the black-billed adult males only, a red sinciput makes its appearance.	4. The immature males have a red crown like that of the females.
5. The ontogeny of the plumage of the more highly specialized species tends to show that they sprang from forms like the simpler ones — green, with red rump and tail-coverts, a yellow or red spot on the throat, but no red on the crown.	5. The development of the Philippine races appears to betoken that they come immediately from a form like their females — green, with red rump and tail-coverts, no spot on the throat, but with a red crown and blue chin and cheeks.

[1]) *L. regulus*, *philippensis*, *siquijorensis* (fide Steere), *apicalis*.

According to the above methods of reasoning, therefore, the genus *Loriculus* consists of two branches and one aberrant species of uncertain position, *L. galgulus*. The two branches by their young throw back to a form resembling *L. vernalis* of the Indian countries, and the more highly-differentiated species of the southern branch by their females and immature males throw back to the simpler species of their branch, which seem to stand nearest to *L. vernalis*. *L. vernalis* should, therefore, stand nearest to the ancestral type. From the postulate, that colonists get most changed, the Indian countries should, therefore, be the original habitat of the ancestral type, which became more and more changed as it proceeded to the Philippines on the one hand, and to Java, Celebes, Halmahera, New Guinea, on the other.

The alternative explanations should now be examined. It may be argued in the first place that the reverse of all the above process has taken place, — that the complex species of New Guinea, Halmahera, and Celebes were the original forms and extended their range westward, gradually losing their specializations of plumage until they became simplified into the modest-looking *L. vernalis* of India. There is the more reason for advancing this argument, as a retrograde development, or at least a change from more complex differentiations of structure and colour to simpler ones, may certainly take place. Species may have a culminating point set to their evolution beyond which they cannot develop, and having attained this they turn again into less specialized forms till they die out, — not from external causes, but because their vitality is exhausted and their career is over. As it is with the individual, so it may be with the species, the genus, the family, and so on. The very centre of the parrots in the Old World is at the present time (and may always have been) Australia and the eastern part of the East Indian Archipelago; Wallace looks upon the Oriental region as the land of origin of the *Psittacidae*, but this is far from being proved in any way, and Reichenow, for instance, offers reasons for making the hypothesis of the eastern origin just as plausible. At all events one has in either case to deal with mere probabilities, as proofs will be wanting till palaeontological facts allow men to abstain from speculations. (Compare Fürbringer's remarks in his fundamental "Untersuchungen" pp. 1116, 1287 and 1293). If the "Stammform" of *Loriculus* originated in New Guinea or the neighbourhood and spread from there westward, the ontogenetic characters, which are treated above as remnants of the phylogenetic development of the genus, must have another meaning, which we cannot explain. The argument that *Loriculus* spread its range from Papuasia to India, though it has this in its favour that the genus issued from the countries which are the richer in Parrots, fails, however, to account for the existence of the branch found in the Philippines and Ceylon, in which the ontogenetic development differs from that of the southern branch to which the Papuan species belong.

The third alternative explanation is that *Loriculus* ranged from India to

Papuasia when the whole was one undivided mass of land, and developed into distinct species when it became isolated by the breaking up of this ancient continent into the present archipelago. The family of the *Psittacidae* is in all probability an old one, existing at least from Miocene times. Unfortunately our knowledge of fossil *Psittacidae* is utterly defective as yet. Only *Psittacus verreauxi* M.-E. of the Lower Miocene of Allier proves that in a milder climate Europe was then inhabited by parrots. Extinct species or genera from other quarters (the Mascarenes, Seychelles, Comoros, and West Indies — from Rodriguez probably allied to *Eclectus*) are more or less subfossil only. As Prof. Fürbringer says (p. 1574):

"The palaeogeography of birds, as based on real finds, still stands on utterly weak legs: only single spots here and there of the earth have as yet been investigated, and discoveries, available for the phylogeny of the bird-class, are restricted to very few localities in Europe and North America. However the geography of living forms allows of some conclusions. Every ornithologist knows the brilliant reasonings of Wallace, the genial conclusions, attained by this author as to the early history of the distribution of birds. Whom do they not captivate, whom do they not induce to make some steps on the same route? Their formal value cannot be too highly appreciated. But sober investigation knows, that nearly everywhere only probabilities come into question here, nay, to a great extent even possibilities only, which may be controverted by other, not less justified suppositions. Very many families may have originated in the oriental region, but more cannot be said now-a-days. Our conclusions as to the distribution of land and water and as to other separating barriers offer some probability only for the caenozoic era; as to the condition before the Eocene we can only make suppositions. And at this period all suborders and gentes of the lower and the far greater number of those of the higher birds very probably were already defined. If someone were to assert that there was a nearly universal distribution of all the various chief-types at this period when the climate was everywhere fairly uniform and explain their later localisation in one region or the other by secondary extinction in the others — no one could offer sure counter-proofs. The possible decisions pro and contra, based upon the present geographical and morphological conditions, have nothing more than a greater or less degree of probability." Further p. 1572: "That in the beginning of the Eocene higher birds were already represented, proves, that the beginnings of the specialization of the *subordines* and *gentes* in view at least already took place at the end of the cretaceous period. It is even very possible that this occurred still earlier, for no one can assert that merely with these poor finds in our hands we already possess the typical forms of those times; the upper cretaceous, especially in its marine deposits, probably contains a great variety of such types as yet undiscovered." And p. 1109:

"Already the Eocene shows us forms which appear to be built after the specialized type of the now-living bird-divisions . . . The variety of Eocene

birds is extremely large and authorizes us to suppose that, what has been found till now from this period, only represents a very small part of the bird-life, already very richly developed in those times. In the Miocene the similarity with the living fauna is further increased . . . and in some cases one can refer the fossil forms even to living genera . . . This similarity with the present time increases much more in the pliocene and quaternary times, when not only living genera but also recent species are represented . . . During tertiary times the present geographical distribution was regulated. Eocene and Miocene with their tropical and subtropical climate still offer in our latitudes birds, which now only live in the tropics or their nearest neighbourhood . . . At the same time towards the end of the cretacious period and in the course of the Eocene and Miocene the continental separations and connections took place (e. g. the separation of Australia from the oriental region at the end of the cretacious period . . .), which . . . were of predominant influence on the distribution of birds."

The foregoing deductions show that there is no reason why the genus *Loriculus* could not have existed from miocene times; by the argument it is assumed that it existed when New Guinea was terrestially joined on to Asia, and ranged over this continent now broken up. The line of reasoning may then be as follows: There exists in all organic beings a tendency to develop in a certain direction, a tendency which is better able to assert itself under isolation. We have already been induced to draw the conclusion that the appearance of a similar red crown in *L. indicus* of Ceylon and *L. apicalis* of the Southern Philippines, and the production of two considerably similar — but not nearly related — birds in the adult males of *L. stigmatus* and *L. bonapartei*, may be ascribed to a tendency to develop red on certain parts. Thus, under long separation *L. stigmatus* of Celebes may have become in virtue of this tendency from a beginning like *L. vernalis* first like *L. pusillus* of Java and have been changing ever since with time in a definite direction; *L. pusillus*, more recently isolated in Java, may have only reached its first simple stage of differentiation, but what *L. stigmatus* now is, or the like, *L. pusillus* may once become, so far at least as local influences allow.

Such or a similar palaeogeographical explanation of the distribution of *Loriculus* meets, however, with many difficulties, which we abstain from detailing, as we here are on too hypothetical grounds. We have only wished to bring before the reader some proofs of our endeavours in searching for the truth, which perhaps future ornithologists studying this case will attain, where we end more or less with a query, though we are inclined to look on our first explanation of the genesis of the species of the genus *Loriculus* as the most reasonable one. We bear, however, in mind, that the facts of geographical distribution and of variation of species are far too complicated to be mastered at the present time; much more knowledge than that of the present day is required to find the clue which will be satisfactory to the critical mind and the impartial judgment of the naturalist.

GENUS APROSMICTUS J. Gd.

This handsome genus is easily distinguished from all the other Parrots occurring in the Celebesian area by its long tail, as long or longer than the wings and strongly-graduated, the outermost feathers not reaching much more than half the length of the tail; fourth primary longer than the first; the reversed toe with the claw about as long as the middle toe without the claw; bill red or mostly red; principal colours red, blue, and green. Eight species ranging from Australia and Papuasia to the Moluccas, Sula and Peling.

† * 54. APROSMICTUS SULAENSIS Rchw.

Red-and-blue Parrakeet.

Plate VII.

a. **Platycercus dorsalis** var. *(1)* Wall., P. Z. S. 1862, 335, 337; 1864, 282, 293 (Sula).

b. **Platycercus dorsalis** *(1)* Schl., Ned. Tdschr. Drk. 1866, 184 (Sula); *(2)* id., Rev. Psitt. 1874, 38 (Sula).

c. **Platycercus amboinensis** *(1)* Finsch, Papag. 1868, II, 250 (Sula).

Aprosmictus sulaensis *(1)* Rchnw., J. f. O. 1881, 128 (Consp. Psitt. 64); *(2)* id., Vogelb. 1878-83 Nachtr. Nr. 16; *(3)* Salvad., Orn. Pap. 1882, III, 515; *(4)* id., Cat. B. XX, 1891, 492; *(5)* M. & Wg., Abh. Mus. Dresden 1896 Nr. 2, p. 8.

"Kakas", Peling, Nat. Coll.

Adult. Entire head, neck, and under parts deep poppy-red, the under tail-coverts with broad mesial streaks of dusky blue; carpus, mantle, back and tail dark blue, brightest on the rump, duskier and more violet according to the light on the tail; the tail-feathers below black, all except the two middle ones tipped with red; wings dark parrot-green, a band of this colour passing across the blue of the upper mantle; metacarpal edge and under wing-coverts blue, slightly mixed with green; remiges below shining dusky. Bill reddish; feet blackish (ad. Peling, V—VIII, 1895, C 14758).

Younger. Differs from the adult in having the cervix and upper mantle green like the wings, the bill varied with reddish and dusky (Peling, C 14514).

Measurements. (3 examples in the Dresden and 2 in the Tring Museum from Peling) wing 182—190 mm; tail ca. 190—195; tarsus ca. 20; bill from cere ca. 20.

Distribution. Sula and Peling. Sula Islands — (Allen *a 1*); Sula Mangoli (Bernstein and Hoedt *b 1*, *b 2*); Peling (Nat. Coll. in Dresd. & Tring Mus.).

Observation. This, and three closely-allied Parrots, may be distinguished as follows:

a. Interscapulary region blue in adult.

a'. Tail below black.

A. dorsalis (Quoy & Gaim.): Distrib. — N. W. New Guinea and the surrounding western Papuan Islands (Salvad.).

b'. Two outer tail-feathers broadly edged with red.

A. amboinensis (L.): Distrib. — Amboina and Ceram (Salvad.).

b. With a green space on the mantle, or interscapulary region green with blue margins in adult.

a''. Larger (wing 215—230), the outermost tail-feathers broadly, the next two pairs narrowly edged with red.

A. buruensis Salvad.: Distrib. — Buru.

b''. Smaller (wing 175); the tail-feathers not edged with rosy, only tipped therewith.

A. sulaensis Rchw.: Distrib. — Sula Islands and Peling.

The Sula form of this Parrot was first discovered, either in Sula Mangoli or Sula Besi or in both islands, by Mr. Wallace's assistant, Allen, and Wallace observed that the Sula birds possessed a reddish bill, whereas in those of New Guinea it is black with the base of the upper mandible red. Schlegel's specimens from Sula Mangoli, from the collections of Bernstein and Hoedt, did not confirm the validity of the differences pointed out, the three first sent to the Leyden Museum all had black bills with some red at the base of the upper mandible. The perfect red bill seems to be a sign of maturity.

The discovery of this handsome species on Peling Island, which is separated from Celebes by a strait of less than 20 kilometers, and its absence on the mainland (so far as is known), is a curious circumstance. It is one of those facts which have led us to consider as probable the opinion that the Peling and Sula groups are the remains of one large island, which has been broken up in comparatively recent times. The genus *Aprosmictus* finds its maximum development in New Guinea, but the eight species recognised by Count Salvadori range from Eastern Australia to Peling.

The Buru form, which probably stands nearest to that of Peling and Sula, is larger and has a broad red border on the inner web of the outer tail-feathers.

Compared with *Tanygnathus*, *Prioniturus* and *Loriculus*, *Aprosmictus* occupies a somewhat remote position; it differs chiefly by its shortened reversed toe, by its long, graduated, broad-feathered, blue tail, and by its general coloration of red and blue.

ORDER PICI.

The Woodpeckers form a part of the heterogeneous group of birds combined under the term *Picariae*, perching-birds which are neither Birds-of-Prey, Parrots, Passeres, nor Pigeons. They include the Woodpeckers, Cuckoos, Hornbills, Toucans, Trogons, Rollers, Swifts, Humming-birds, Kingfishers, Bee-eaters, and others. Some of these birds contrast as strongly with others as do the long-acknowledged Orders; for instance, the Woodpeckers

differ from the Swifts, the Hornbills from the Humming-birds as greatly as do the *Accipitres* from the Parrots or the *Passeres* from the Pigeons. In the "Catalogue of Birds", the sections of the *Picariae* are titled Suborders; in the "Fauna of British India, Birds" vol. III, Mr. Blanford prefers to treat them as Orders. We have employed the latter term for this work. The Pici are represented by the single

FAMILY PICIDAE.

Woodpeckers in life attract attention chiefly by their habit of clinging and climbing on the stems and branches of trees, pecking away the bark and wood, often making thereby a loud hammering, in search of the insects and their larvae on which they feed, or in forming the cavities in which they may eventually breed. The eggs laid therein are glossy white; the young in first plumage are known sometimes to resemble the male, when the sexes differ in adult plumage. The birds have no song, properly so called, though in the breeding-season they may utter peculiar notes. The well-known "drumming" made at this season by some species is caused by the bird striking a dead branch and then suffering the vibrating wood to beat against the tip of the bill. The flight is weak and undulating. In size the Woodpeckers vary from the dimensions of a Wren to those of a Crow; the most common colours are green, black, white, ochraceous, red, and yellow; pure blue is, we believe, absent.

A Woodpecker has a zygodactyle foot — the outer (fourth) toe being reversed, a character which at once distinguishes it from certain *Passeres*, such as the Nuthatches, Tree-creepers and Tits, which share to some extent its habits; the claws are curved to a semicircle (circa), are very narrow and deep. The bill is strong, straight, or nearly so, often sharpened laterally at the tip to a chisel-like point; the "tongue is very long, worm-like, provided with a pointed horny barbed tip, capable of great protrusion, the hyoid cornua extending backwards over the skull (except in *Sphyropicus* and *Xenopicus*)" (Hargitt, Cat. B. XVIII, 2); the occipital foramen appears to be placed well under the skull; the skin of the neck fits closely, so that in skinning the skull often cannot be passed through it; the keel of the sternum is low, the manubrium is furnished posteriorly with two processes on either side. There are twelve tail-feathers, which in the true Woodpeckers are stiffened and spiny, and used to support the body in clinging and climbing; in the Piculets *(Picumninae)* and Wrynecks *(Iynginae)* the tail-feathers are soft and ordinary, and these forms are distinguished as Subfamilies. For further particulars see Marshall, "Spechte", 1889; Hargitt l. c., Blanford l. c., and others.

GENUS IYNGIPICUS Bp.

The Pygmy Woodpeckers are about the size of a Sparrow; the bill about as long as the head tapering to a point; the wing rather long, the first primary very small, about 1/4 the length of the second, the 3rd, 4th and 5th are the longest; the reversed fourth toe is longer than the third toe; the tail is short, about 1/2 the length of the wing, the lateral rectrices normal and not much stiffened, the middle feathers and to a less extent the adjacent feathers pointed and stiffened. Hargitt recognised 18 species ranging from India, E. Asia and Japan to the Philippines, Celebes and Flores, and one aberrant species with a wide range in Africa.

+ * 55. IYNGIPICUS TEMMINCKI (Malh.).

Temminck's Pygmy Woodpecker.

a. **Picus temmincki** *(1)* Malh., Rev. Zool. 1849, 529; *(II)* Malh., Picidae 1861, I, 155, pl. XXXVI, fig. 3 ♀; *(3)* Brüggem., Abh. Ver. Bremen 1876, V, 49; *(4)* Rosenb., Malay Archip. 1878, 275 (Timincki err.).

b. **Yungipicus temmincki** *(1)* Bp., Consp. Vol. Zygod. 1854, 8; *(2)* Walden, Tr. Z. S. 1872, VIII, 41, 111; *(3)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 647; *(4)* Meyer, Ibis 1879, 57; *(5)* Platen, Gefied. Welt 1887, 206.

Iyngipicus temmincki *(1)* Hargitt, Ibis 1882, 49; *(II)* Gould, B. Asia VI, pl. XXV, ♂, ♀ (1882); *(3)* Guillem., P. Z. S. 1885, 546; *(4)* Marshall, Die Spechte 1889, 64; *(5)* Hargitt, Cat. B. XVIII, 1890, 335; *(6)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 6; *(7)* iid., ib. 1896, Nr. 1, p. 8; *(8)* Hartert, Nov. Zool. 1896, 159; *(9)* id., ib. 1897, p. 158.

"**Tatangkul kokie**", Manado District, Nat. Coll.

"**Tukang ketjil**", Malay, near Manado, Nat. Coll.

For further synonymy and references see Hargitt *4*.

Figures and descriptions. Gould *II*; Malherbe *a II*, *a 1*; Walden *b 2*; Salvadori *b 3*; Hargitt *1*, *5*.

Adult male. Mantle, back, and scapulars dusky olive-green, barred with buffy; rump uniform buff; upper tail-coverts and tail darker buff, barred with bistre-brown; wing-coverts and quills darker dusky olive-green, marked with rather large buffy white spots on the outer webs of the coverts near their ends, notched with buffy on both webs[1]) of the quills nearly meeting so as to form bars about 8 mm apart; head above and ear-coverts olive; lores, a supra-orbital stripe, sub-orbital and malar stripe, and a nuchal patch, buffy white; a collar behind ear-coverts, not quite meeting at the nape, scarlet-vermilion; chin and throat slate-grey, the ends of the feathers white; under surface bistre-brown, the margins of the feathers paler and fulvous — whitish on the sides and flanks, — giving a broadly streaked appearance; under wing-coverts white, olive about the metacarpal edge; quills below olive, more broadly barred with white than above (near Manado, [♂] Aug.-Sept. 1892, C 10856).

"Iris brown ["dull crimson", Doherty *9*]; bill greyish brown; tarsus dull olive" (Guillem. *3*).

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[1]) Hargitt speaks only of the outer webs of the quills as being spotted with white.

Adult female. Similar to the male, but without the scarlet patches on the sides of the occiput (Manado, ♀, Mch. 1871, C 473, 474).

Some specimens present a much more barred appearance on the back than others. This may be a matter of age, the more uniform specimens being probably the younger.

Measurements.	Wing	Tail	Bill from nostr.	Tarsus
a. (C 10856) [♂] ad. near Manado	76	30	13.5	13.5
b. (C 5157) [♂] ad. Manado	75	33	12.5	—
c. (C 5158) [♀] ad. Manado	75	38	—	—
d. (C 474) ♀ ad. Manado	79	40	—	13.5
e. (C 473) ♀ ad. Manado	79	39	13	14
f. (Sarasin Coll.) ♀, Tomohon, 5. IV. 94	76	35	13	14
g. (C 14907) ♂, Indrulaman, S. Cel., Oct. 95 (Everett)	79	34	15	14
h. (Sarasin Coll.) ♂, Macassar, 27. VIII. 95	79	35	14	14
i. (Sarasin Coll.) ♀, Macassar, 11. VI. 95	85	39	15	14.5

Egg and breeding habits unknown.

Distribution. Celebes — South Peninsula (Wallace *b 2, 4*, P. & F. Sarasin, Everett *8*); Minahassa (Rosenb. *a 4*, Meyer *b 4*, Fischer *a 3*, Guillem. *3*, etc.).

This little Woodpecker has as yet only been recorded from the northern and southern extremities of Celebes. Hargitt makes no mention of differences in the southern birds, such as are found in the other Celebes Woodpecker, *Microstictus fulvus*, in its southern quarters, neither have we been able to detect any, and there can be little doubt that *I. temmincki* will be found to range all over the island. Most writers speak of it as a rare species; it was not found to be so by Meyer near Manado, nor, apparently, by our native collectors in August and September, 1892, when five specimens were obtained in the same neighbourhood. Dr. Platen met with it among the orange and coffee plantations near Rurukan (3000 ft.). Nothing has been recorded of its habits. The allied *I. canicapillus* (Bl.) of Tenasserim is said by Davison (Str. F. VI, 125) to frequent old clearings, moderately thin jungle, groves of trees, etc., but to avoid, as a rule, dense forest or bamboo jungle. *I. gymnophthalmus* of Ceylon and South India is said to live in the highest branches of trees (Legge, B. Ceylon, 187). "Its powers of flight, afforded by its long wings, are considerable".

The nearest known ally of *I. temmincki* is *I. ramsayi* Hargitt of the Sooloo Islands. With one exception the genus *Iyngipicus* is confined to the Oriental Region, but, like *Pelargopsis*, it crosses Wallace's line between Bali and Lombok, a species being found in the latter island, Sumbawa, and Flores. *I. temmincki* and *I. ramsayi* are, unlike the rest, "above olive-brown" — we should add with a strong wash of green in the former — "striped or barred with white"; the remaining Oriental forms are "above black and white, the white uniform or barred", but *I. ramsayi*, in the coloration of its under surface, betrays affinity to *I. aurantiiventris* (Salvadori) of Borneo. *I. temmincki* appears to be one of the most distinct members of the genus. The single species occurring elsewhere outside the Oriental Region is *I. obsoletus,* which ranges,

according to Hargitt, from N. E. Africa to Equatorial Africa, westward to Senegambia, a remarkably wide distribution for a genus the species of which are so narrowly located elsewhere. This is an aberrant form, though Edward Hargitt considers it a true *Iyngipicus*. It is very far removed in characters from *I. temmincki*. A few remarks on the distribution of the East Indian Woodpeckers will be found under *Microstictus fulvus*. As is well known to ornithologists, no species of Woodpecker is known east of the Molucca Straits, the family being entirely absent from the Australian region, through occurring elsewhere all over the world — except in Madagascar and the Pacific Islands — from about the Arctic Circle, south to South Patagonia, the Cape, Flores and Celebes (see Marshall, Spechte, 1889, 42, 43).

GENUS MICROSTICTUS[1]) Harg.

A genus of four species restricted to Celebes and the Philippines. In size about equal to a Turtle Dove; exposed culmen not longer than the head; nostrils feathered; tip of upper mandible chisel-edged; third toe longer than the reversed fourth toe; tail nearly as long as the wings, the individual rectrices terminally narrowed, and stiffened like whale-bone; first primary half as long as the second; 4th, 5th and 6th subequal and longest.

+ * 56. MICROSTICTUS FULVUS (Q. G.).

North Celebesian Slate-and-fawn Woodpecker.

a. **Picus fulvus** *(1)* Quoy & Gaim., Voy. Astrol. 1833, text, 228, Atl. pl. 18, fig. 2 (♂); *(2)* Rosenb., Malay Archip. 1878, 275 (hulvus); *(3)* Joest, Das Holontalo 1883, 105.

b. **Hemilophus fulvus** *(1)* Gray, Gen. B. II, 1846, 439; *(II)* Rchb., Handb. Picinae 1854, 385, t. 644, f. 4302—03.

c. **Dryopicus fulvus** *(1)* Malh., Picidae 1861, I, 53, pl. XIV, fig. 1 ♂, 2 ♀.

d. **Campethera fulva** *(1)* Gray, HL. 1870, II, 193; *(2)* Brüggem., Abh. Ver. Bremen 1876, V, 48.

e. **Mulleripicus fulvus** *(1)* Wald., Tr. Z. S. 1872, VIII, 41 pt. (Manado); *(2)* Garrod, P. Z. S. 1873, 630; *(3)* Lenz, J. f. O. 1877, 366; *(4)* Meyer, Ibis 1879, 57, 145; *(5)* Guillem., P. Z. S. 1885, 546.

f. **Alophonerpes fulvus** *(1)* ? Salvad., Ann. Mus. Civ. Gen. 1875, VII, 646; *(2)* W. Blas., Ztschr. ges. Orn. 1886, 87; *(3)* Marshall, Die Spechte 1889, 58 (Borneo err.).

Microstictus fulvus *(1)* Hargitt, Cat. B. XVIII, 1890, 490; *(2)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 6; *(III)* Meyer, Abb. Vogelskel. 1897, pl. CCXXVII.

"Burong tukan" (Carpenter Bird). Malay name, Minahassa (Meyer *e 4*, Guillem. *e 5*, Nat. Coll.).

"Rumerkukor" (Meyer) near Manado.

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[1]) Mr. Hartert (Nov. Zool. 1897) would reinstate the name *Lichtensteinipicus*, intended by Bonaparte for the Philippine form, *M. funebris*, but by the Rules of Nomenclature, Hargitt was justified in rejecting it, since it has, we believe, never been described. Hargitt's *Microstictus* (type, apparently, *M. fulvus* of Celebes) has been properly diagnosed (Cat. B. XVIII, 7, 489).

"Tatankul" — near Tanawangko, Meyer, — or "Tatankul Sela", Nat. Coll, Minahassa.
"Tukan besar", Malay, Minahassa, Nat. Coll.
"Bitu-bitua", Gorontalo, Joest *a 3*.
"Widi-widua", Rosenb. *a 2*.

For further synonymy and references see Hargitt *1*.

Figures and descriptions. Quoy & Gaimard *a I*; Reichb. *b II*; Malherbe *c I*; W. Blasius *f 2*; Hargitt *1*.

Adult male. General colour above dusky slaty, becoming dark bistre-brown on the upper tail-coverts and tail-feathers, the shafts of which are whity-brown in places, both shafts and webs pure bistre towards the tip; entire front part of head, including forehead, crown, sides of head, and malar region, as far as a line drawn about 5 mm behind the eye, red (yellowish crimson); remaining parts of the head and hind neck slaty like the back, but each feather furnished with a small tip of white. Chin and throat broccoli-brown, speckled with minute white tips to the feathers; remaining under parts buffy clay-colour; tail below broccoli-brown washed with tawny-olive towards the tip; under wing-coverts slaty, touched with clay-colour (Banka Id. off N. Celebes, 16. V. 93 — C 12275). "Iris light yellow; bill black; feet greenish grey" (Guillem. *e 4*).

E. Hargitt remarks that the red immediately behind the eye is developed in very old males only. This appears to be the case in our specimens also, though one or two which must be old, judging from their bills, have no red behind the eye.

Adult female. Similar to the male, but without red on the head, this colour being replaced by dusky slaty grey like the hind head, speckled with smaller white tips (Banka Id. 19. V. 93 — C 12276, Manado, C 5156).

Immature [female]. Like the adult female, but with the crown and most of the forehead red; under parts browner (N. Celebes, C 3600). Obs.: Hargitt was evidently quite right in describing a similar specimen as a young female. His opinion is fully confirmed by two immature specimens of the next species from East Celebes; they are casting off the old worn red feathers on the top of the head and are acquiring new ones of slaty with whitish spots, as in the adult female. The young therefore resembles the male more than the female.

Fledging male. Differs from the above plumage (as described *1*) in having the red patch on the forehead and crown more marked and richer in colour; the under parts more of a sandy grey; the tail-shafts lighter and the under surface of the tail greyer (Hargitt).

Measurements (12 specimens). Wing 176—189 mm; tail 150—172; tarsus 30 ca.; bill 28.5 (♀ ad. and ♀? imm.) — 36 (♂ ad.)

Egg and nest. Two, seldom three, eggs in a hole of a dead tree (Meyer *e 4*).

Distribution. Celebes, Northern (and S. E.?) Peninsula: — Lembeh, Banka and Mantehage, — Is. off the Minahassa (Nat. Coll. in Dresd. Mus.); Minahassa (Meyer *e 4*, Guillem. *e 5*, *etc.*); Gorontalo District (Meyer *e* 4, Joest *a 3*); Togian Islands (Meyer *e* 4); (?) Kandari, S. E. Celebes (Beccari *f 1*).

Touching the occurrence of this form in the S. E. Peninsula, Prof. W. Blasius (Z. ges. Orn. 1885, 239) remarks: "As at this place the southern *Streptocitta*-species: *albicollis* occurs, it would be very remarkable if the *Alophonerpes- (Microstictus)* species were not also the southern *wallacei*." Blasius' opinion is strengthened by the discovery of *M. wallacei* in Central and East Celebes.

Next to nothing has been recorded of the habits of *M. fulvus*: Meyer remarks that it feeds on tree insects, on white ants, caterpillars, etc., as all

Woodpeckers. Lives in pairs. If the male and female lose each other, the male knocks and the female follows the sound".

The genus *Microstictus* is, as Hargitt shows, peculiar to Celebes and the Philippines, being represented in the latter islands by two species, *M. fuliginosus* (Tweedd.) of Mindanao and Samar (Steere) and *M. funebris* (Valenc.) of Luzon, Marinduque and Cagayan. These forms differ widely from *M. fulvus* in coloration, being unicolorous above and below, but they (*M. funebris* at least) seem to possess no structural differences and might almost be described as small melanistic races of *M. fulvus*.

The genus *Microstictus* is most nearly related to *Hemilophus*, the single species of which, *H. pulverulentus*, was found by Hargitt to range from the Himalayas to the Malay Peninsula, Sumatra, Java, and Borneo.

The geographical distribution of the Woodpeckers, as a family, is of high interest. "It is similar", writes Marshall (Spechte, p. 42), "to that of the Cats, Dogs, Martins and Squirrels; the Woodpeckers are wanting, like these, in Madagascar and in by far the greatest part of the Australian Region, where in contrast to the mammals mentioned they occur further in Celebes[1]), as they also, likewise in contrast to these, are found in the West Indies. In two parts of the earth they have attained a remarkable development, a great richness in original, well marked genera and beautiful species, namely in tropical America and in India, a fact which stands in the closest connection with the increased diversity and greater richness of the forests. In America their range extends from Port Famine in the south to beyond the Polar circle in the north, and under the equator from the strand to 14,500 feet above the sea-level in the Andes. They are found in the islands off the coast of Chili and western North America, on most of — perhaps all — the West Indies and Bermudas, but are wanting on Juan Fernandez, Mas a fuero, as also in the Galapagos Islands and in the Bahama Group at least as breeding birds. In the Old World they reach on the West coast from 70° N. to the Cape, but are found in the islands of the Atlantic only in Great Britain, in the Azores and the Canaries. In the eastern half they are met with from about the Polar Circle as far as Celebes and the Philippines, are wanting, however, in the islands east of a line drawn from Cape Navarin along the east coasts of Kamtschatka, the Kurile Islands, the Japanese Archipelago and the Loochoo Islands as far as Cape Engano in Luzon".

As compared with other Picariae in the East Indies the Woodpeckers correspond best as regards their distribution with the *Bucerotidae*; also to some extent with the *Phaenicophaeinae*. All three groups — excepting one genus of

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1) Prof. Marshall is, however, in error in excluding Celebes from the range of the Squirrels, four species being known from the island, three of which are peculiar, and none occur farther east; also a species of *Paradoxurus* and one of *Viverra* belong to it. Two other families of mammals, unknown in Madagascar and in the Australian Region — except in Celebes — might be added, viz. the Apes, and the Oxen, though the first are of course confined to the warmer parts of the globe.

Buceros of good flying-powers in marked contrast to its fellows — are absent from the Australian Region; all three, also, are absent from the Sangi Islands, a circumstance which speaks for their recent volcanic upheaval. As in the case of the *Bucerotidae*, Celebes has two Woodpeckers, one rather large, the other a small one, which, moreover, find their nearest allies in the Philippines with Sooloo. The *Bucerotidae* greatly enforce Mr. Wallace's view of the former land-connection of Borneo, Sumatra and Malacca and of the earlier separation of Java from them, and a certain amount of similar proof is brought by the Woodpeckers. As Hargitt shows in his Catalogue the same species of the following Himalayan or tropical genera are peculiar to Malacca, Sumatra and Borneo, whereas Java has its own peculiar species of them, viz.

Malacca, Sumatra and Borneo	Java
Chrysophlegma (2 sp.)[1]	*Chrysophlegma* (2 sp.)
Gauropicoides	absent
Lepocestes	absent
Miglyptes (2 sp.)	*Miglyptes* (1 sp.)
Hemicercus	*Hemicercus*.

On the other hand several other Himalayan genera extending into the Sunda Islands are represented by identical species in Java, Borneo, Sumatra and Malacca, viz. *Tiga*, *Chrysocolaptes*, *Hemilophus* (ranging to the Himalayas in one species), *Thriponax* (also in the Philippines) and *Iyngipicus* (most species of which are local, but one, *I. auritus* Eyt., has the above range extending further to Cochin China). *Micropternus*, an Indo-Chinese form connects the Malay Peninsula, Sumatra and Java by a subspecies of the Indo-Siamese *M. phaeoceps*, while Borneo has its own peculiar species. The wide-spread *Dendrocopus* of Europe, Asia, N. America and southern S. America also has a species in Malacca, Sumatra and Java, but is wanting in Borneo. The two last-named genera are, however, more likely than the others to have extended their range by migration, because they belong to a more northern area — especially *Dendrocopus*. Of particular interest is the reoccurrence of the South and Central American genus *Picumnus* in the Oriental Region from the Himalayas and China south to Sumatra.

To account for the distribution of the Woodpeckers Wallace suggests a Central Asiatic origin, whence they spread to South America by way of North America, and developed into great diversity of form under the favourable conditions of the Neotropical forests (Geogr. Distr. II, 303). Tristram has urged a circumpolar origin. Marshall speaks for their evolution in the New World from the Passerine branch, and their gradual spread into the eastern Palaearctic Region, whence, as in North America, they were driven southwards by the glacial period, to work their way in many cases north again as the cold moderated. This view contains, perhaps, the fullest explanation.

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[1] Sumatra and Malacca have each a peculiar species.

Marshall by no means makes it clear, however, why Celebes should have been colonised by its two Woodpeckers "at a much later time" than the other Sunda Islands. The two Celebesian species are very distinct from the other members of their genera in the Philippines and the Bornean Province, and they should be regarded as very long separated from the rest. On the other hand, as has been shown, the species of many genera in Java, Borneo and Sumatra are identical with, or but little different from, those of Malacca and S. E. Asia. These, therefore, may be considered either to have more recently invaded these islands by flight, or to have been recently cut off in them by the submergence of land. Though their wings are of good size, Woodpeckers do not appear to attempt long flights, except, perhaps, the *Colaptes* of America, in which it is, as Malherbe says, rapid and prolonged; the keel of the sternum is shallow and the pectoral muscles, judging from the birds' appearance on the wing, are feeble, and the habits of the family only call for flight in launching themselves from one tree to another, or in making their way at a low elevation to the next wood. Their absence in New Guinea and Madagascar, where, as Marshall points out, there can be no lack of suitable insect-food, and in the islands of Polynesia, where indeed insects are very scare, prove them, as might be expected from their flight and habits, to be birds to which a narrow sea-passage is a formidable barrier. On the whole, evidence is in favour of the view that *Microstictus* and *Iyngipicus* reached Celebes at a time when Borneo, Sumatra and Java were united to the Asiatic continent and when Celebes itself and the Philippines were also nearly or quite in touch with the continent. Submergence then put a sufficient barrier between it and Celebes, while new forms from the north subsequently invaded the other countries and gave the Philippines, Borneo and Java an avifauna so much richer in *Picidae* than that of Celebes.

* 57. MICROSTICTUS WALLACEI (Tweedd.).

Wallace's Slate-and-fawn Woodpecker.

a. **Alophonerpes fulvus** *(1)* Cab. & Hein. (nec Q. & G.), Mus. Hein. IV, pt. 2, 1863, 107; *(2)* ? Salvad., Ann. Mus. Civ. Gen. 1875, VII, 646; *(3)* Tristr., Cat. Coll. B. 1889, 102; *(4)* Heine & Rchnw., Nomencl. Mus. Hein. 1890, 216, pt.

b. **Mulleripicus fulvus** *(1)* Wald., Tr. Z. S. 1872, VIII, 41.

c. **Mulleripicus wallacei** *(1)* Tweedd., Ann. & Mag. N. H. 1877, XX, 533; *(2)* id., Collected Orn. Works 562, 667; *(3)* P. & F. Sarasin, Z. Ges. Erdk., Berlin 1895, 327.

d. **Alophonerpes wallacei** *(I)* W. Blas., Ztschr. ges. Orn. 1885, 209, 236, pl. XI, ♂, ♀.

e. **Microstictus wallacii** *(1)* Hargitt, Cat. B. XVIII, 1890, 491.

Microstictus wallacei *(1)* Büttik., Zool. Erg. Weber's Reise in Ost-Ind. 1893, 273; *(2)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 1, p. 8; *(3)* iid., ib. Nr. 2, p. 10; *(4)* Hartert, Nov. Zool. 1896, 159; *(5)* id., ib. 1897, 158.

f. **Lichtensteinipicus wallacei** *(1)* Hart., Nov. Zool. 1897, 164.

"Bantinotto", Tjamba District, Platen *d I.*

"Sumboli", Tonkean, E. Celebes, Nat. Coll.

Figure and descriptions. W. Blasius *d I*; Tweeddale *c 1*; Hargitt *e 1*.

Adult male. Differs from the adult male of *M. fulvus* in having the red of the head carried much further back, so as to include the occiput and entire sides of head; the tail much darker (Blas. *d I*, Hargitt *e 1*, ♂, Indrulaman, Oct. 95, Everett — C 14901). Iris light yellow; bill black; feet lead-grey (Platen *d I*).

Adult female. Differs from the adult female of *M. fulvus* in having the ground-colour of the chin and throat wood-brown, upon which the white tips of the feathers stand out much less distinctly than on the broccoli-brown; tail much darker, "brownish dusky above and below, the shafts nearly black above, their under side dusky, with smoky white bases". Iris, etc. as in male. (W. Blas. *d 1*, Hargitt *e 1*; Tjamba, 24. V. 78 — C 10425).

Young male. With less red on sides of face than in adult male; malar stripe red; lores, orbital region and fore parts of ear-coverts unspotted dusky grey, a few feathers under eye tinged with crimson; ground-colour of chin and throat more dusky, the spots more rounded and very minute; chest and breast of a more dingy buff colour, many of the feathers with dusky shaft-streaks; shafts of tail-feathers browner, and their bases very much paler (ex Hargitt).

Immature [female]. Head above red; in other respects like the adult ♀. (Tonkean, E. Cel., V—VIII. 95 — C 14460 — moulting.)

Measurements (12 specimens). Wing 178—192 mm; tail 145—172; culmen 37—45; rictus 43—52; tarsus 30—33 (W. Blasius *d I*); bill from nostril e. 30—46 mm.

Distribution. Celebes: — Southern Peninsula (Wallaee *c 1*, *e 1*, Platen *d I*, Weber *1*); Luwu at the head of the Gulf of Boni (Weber *1*), Lembongpangi, S. Centr. Celebes (P. & F. Sarasin *c 3*, *2*); Tonkean, E. Celebes (Nat. Coll. *3*); ? Kendari, S. E. Peninsula (Beccari *a 2*); Dongala, W. Celebes (Doherty *f 1*).

Observation. This Woodpecker is now known from South, Central, West and East Celebes and will very likely prove to be the species of all parts of the island except the North Peninsula, where it is represented by *M. fulvus*. It was probably this species, rather than *M. fulvus*, that Beccari found in S. E. Celebes. There seem to be no differences of colour in *M. wallacei* from different parts of its range, and transitions towards *M. fulvus* are not yet known, so that the two may be regarded as species, though they may turn out later as subspecies of a single form.

ORDER COCCYGES.

Two families are placed in this order or suborder by Shelley (Cat. B. XIX, 209) and Blanford (Faun. Br. Ind., B. III, 1895, 203), viz. the Cuckoos *(Cuculidae)* and Touracos *(Musophagidae)*, an African family. In the former the outer toe is always reversed, and the oil-gland nude; in the Touracos the outer toe is reversible, the oil-gland tufted (Shelley) and "the bill of nearly all the species is curiously serrated or denticulated along the margin" (Newton, D. B. 982).

On the order *Coccyges* Mr. Blanford remarks: "This is distinguished from all other zygodactyle groups, except the Parrots, by possessing the ambiens muscle, a character to which a very high importance was attached by Garrod, and by the deep plantar tendons being arranged as in Gallinaceous birds, and

only differing in arrangement from the Passerine plan by being connected by a vinculum; the *flexor longus hallucis* leads to the hallux alone, the *flexor perforans digitorum* serves the other three digits. The palate is desmognathous; basipterygoid processes are wanting". Resemblances to the *Gallinae* and the *Opisthocomus* have been pointed out by Huxley and Garrod; an important point of difference is that the young of the *Gallinae* run about and feed themselves as soon as they are hatched, but the young of the *Coccyges* are hatched naked and helpless, in which they resemble the Pigeons more.

FAMILY CUCULIDAE.

The best external clues to the recognition of a Cuckoo-form are, perhaps, furnished by the zygodactyle foot (the outer toe reversed), the claws usually weak, the bill decurved and usually weak, with the nostrils exposed (except in 2 or 3 genera, *Dasylophus*, *Lepidogrammus*), the tail-feathers 10 in number (except in *Crotophaga* and *Guira*, which have only 8) and often long and broad. The following anatomical and pterylological characters are noted by anatomical writers: Palate desmognathous; basipterygoid processes absent; caeca present; both carotids present; contour-feathers without any aftershaft; dorsal feather-tract divided between the shoulders, and enclosing a lanceolate naked space on the back; oil-gland present, but nude; young hatched naked, and not passing through a downy stage before acquiring feathers. Shelley recognises 6 subfamilies, of which three, *Cuculinae*, *Centropodinae*, and *Phoenicophainae* occur in Celebes, and *Scythrops* is entitled to be regarded as a fourth subfamily.

SUBFAMILY CUCULINAE.

The true Cuckoos may be recognised, as Shelley points out, by their long, flat wings which do not fit closely to the body, and the longest primaries overreach the secondaries by more than the length of the tarsus or bill. The tail rarely exceeds the wing in length (*Coccystes*, *Cacomantis* and *Surniculus* are exceptions. They are parasitic in their habits, at least in most cases.

GENUS HIEROCOCCYX S. Müll.

A genus which hardly differs from *Cuculus* except in having the wing less pointed, the secondaries being about $^2/_3$ to $^3/_4$ wing-length, instead of only about $^1/_2$ as in *Cuculus*, and the tail-feathers crossed with four or five dark bands, instead of having them (in the adult) black with spots of white at intervals against the shafts of the feathers. Six species are recognised by Shelley, ranging from East Siberia and India to Celebes. One of them, *H. sparverioides*, has been observed to build its own nest and brood on its eggs, but it has also been recorded as parasitic, like, so far as is known, its fellow-species.

+ * 58. HIEROCOCCYX CRASSIROSTRIS Tweedd.

Blunt-winged Cuckoo.

Hierococcyx crassirostris *(1)* Wald., Ann. & Mag. N.H. 1872, 305; *(II)* id., Tr. Z. S. 1872, VIII, 116, pl. 13; *(3)* Meyer, J. f. O. 1873, 405; *(4)* Platen, Gefied. Welt 1887, 219; *(5)* Shelley, Cat. B. XIX, 1891, 239; *(6)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 6.

a. **Cuculus crassirostris** *(1)* Brügg., Abh. Ver. Bremen, 1876, V, 59.

"Kokokuk" (meaning simply a Cuckoo), Tondano, Nat. Coll.

Figure and description. Walden *II, 1*; Shelley *5*.

Adult. Head, neck, ear-coverts, and cheeks rather pale slate-grey; upper surface dark rufous brown, the margins of the wings mottled with russet, the rump and upper tail-coverts redder and obscurely tipped with grey like the head; metacarpal joint white; tail rufous brown, brighter than the back, tipped with white and crossed with three or four broad bands of black, the interspaces on the more lateral feathers chiefly white or white mingled with rufous, the middle feathers all rufous brown with a broad terminal band of black and a black spot indicating another band with a small spot of white adjoining; under surface white, thickly barred with slaty black on chin and throat, with purer black across chest, breast, sides and flanks; under tail- and wing-coverts white, the latter with a brown spot here and there at the edge of wing and on the longer series; quills below broccoli-brown, white towards base (near Tondano, Aug.—Sept. 1892 — C 10796).

"Bill black, at base of lower mandible yellow; bare skin round the eyes gold-yellow; feet gold-yellow". Other adult specimens (all marked ♂) for the loan of one of which we are indebted to Mr. Nehrkorn, while the others are in the Sarasin Collection, are like the above. "Iris brown; bill black, below yellow-green; orbits and feet light yellow" (Rurukan, 2. XI. 84 — Platen in Mus. Nehrk. Nr. 931).

Immature. Differs from the adult in having the head above brownish slaty; neck and upper surface chestnut (i. e. lighter and redder), some remains of dark bars on the tertiaries above; below buffy — not pure — white, plentifully barred with blackish brown, except on under wing- and tail-coverts (Minahassa — Nr. 2207). This is like fig. 2 of Lord Walden's plate, but the under surface is more thickly barred. As Captain Shelley points out, the tail in this figure conveys a wrong impression, the two middle feathers being lost; there is no white except at the tip on the middle tail-feather (there is only one remaining) of our specimen, though the shaft is pale at one spot.

Young. A younger specimen in the Nehrkorn Coll. (Nr. 930 — Rurukan, 10. XI. 84: Platen) differs from that described in being still paler rufous brown above, with the mantle indistinctly spotted; below still more thickly barred with black. "Iris brown; bill brown, below yellow-green; orbits and feet light yellow".

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (C 10796) ad. Tondano	208	170(c)	24	21
b. (Mus. Nehrk. Nr. 931) ad. Rurukan	203	177	24	—
c. (ib. Nr. 930) juv. Rurukan	198	170	23	19
d. (Nr. 2207) juv. Minahassa	200	175(c)	23	20
e. (Sarasin Coll.) ♂ ad. Kema, 23. X. 93	208	180(c)	25	20
f. (Sarasin Coll.) ♂ vix ad. Loka, S. Cel., 31. XI. 95	202	—	24	19.5
g. (Sarasin Coll.) ♂ ad. Matanna-Tomori, 7. III. 96	216	—	26	20

Distribution. Celebes: — North Celebes (Meyer *1*, Faber in Dresd. Mus., Fischer *a 1*), Rurukan (Platen); near Tondano (Nat. Coll. in Dresd. Mus.), Mount Klabat (Platen *4*), Kema (P. & F. S.); Matanna-Tomori, Central Celebes (id.); Loka, S. Celebes (id.).

This Cuckoo is the most aberrant member of the genus *Hierococcyx*, differing, as Capt. Shelley points out in his key to the species, from the other forms in having the under surface of the quills not distinctly barred, except at the base, a point which also distinguishes it from *Cuculus*. The bill is exceptionally stout and large; the middle tail-feathers display one or two isolated white spots against the shaft, a peculiarity well developed in *Cuculus*, but not seen in *Hierococcyx* except in the present case. The wing of *H. crassirostris* is also less pointed that in *H. sparverioides*, the ends of the secondaries reaching $^5/_7$ of the wing-length as against $^2/_3$ in the latter species, and about $^1/_2$ in *Cuculus*. This form cannot be regarded as a local differentiation of one of the wider-spread members of the genus, it appears to be an independent development of a stock now not existing anywhere else.

The bird was first discovered by Meyer in 1871 and was only known from North Celebes; it would appear to be partial to the hills. Thus, Dr. Platen met with it at Rurukan (3000 ft.) and on the slopes of Mt. Klabat, and we have recently received a specimen from near the high-lying lake of Tondano, while the Sarasins' specimen from near Loka was killed at about 4500 ft. alt.

The tail-feathers of this species are more than usually instructive in their bearing upon the question of changes of coloration provoked by exposure to light. The outermost pair in an adult before us are white barred with black; the white on the next pair, especially on the outer web, is discoloured with rufous brown, giving the appearance that the black had become washy and had "run", soaking into the white, with the result of a rufous brown colour. On the third pair this process is more advanced, especially again on the more exposed outer web, which is now rufous brown, with little isolated pools of white close up to the shaft, showing where the white bars should be, and with the black bars no longer reaching to the external edge of the feather, but blackest near the shaft and then gradually seeming to melt or become diluted until they pass into the rufous brown of the rest of the web; on the inner webs, however, the black and white bands are well separated, particularly towards the base of the feathers. On the fourth pair the same thing is seen still more advanced, the black bars on the outer webs being further reduced, but on the inner webs the black and white colours are well separated. On the fifth or middle pair (Cuckoos have only ten tail-feathers) where both webs are exposed, the black and white colours are converted on both webs into an almost uniform rufous brown, except at the tip of the tail which is white, the broad terminal band of black, a minute pool of white higher up, and some signs of a black spot (the larger half of which is on the inner web), while the shaft partakes of the colours through which it passes; nevertheless, on raising the upper tail-coverts and looking at the base

of the feathers, it is seen that here, where they are not exposed, they are white and black, and entirely white at the extreme base.

+ 59. HIEROCOCCYX SPARVERIOIDES (Vig.).

Large Hawk-cuckoo.

a. **Cuculus sparverioides** *(1)* Vigors, P. Z. S. 1831, 173; *(II)* Gould, Cent. Himal. B. 1832, pl. 53; *(3)* David & Oust., Ois. Chine 1877, 63.

Hierococcyx sparverioides *(1)* Bp., Consp. Av. 1850, I, 104; *(2)* Hume, Str. F. III, 1875, 80; *(3)* Hume & Davis., Str. F. VI, 1878, 157; *(4)* Oates, B. Br. Burm. 1883, II, 108; *(5)* A. Müll., J. f. O. 1885, 157; *(6)* Oates, ed. Hume's Nests & Eggs Ind. B. 1890, II, 384; *(7)* Shelley, Cat. B. XIX, 1891, 232; *(8)* Tacz., Faun. Orn. Sib. Orient. II, 1893, 694; *(9)* Rickett, Ibis 1894, 222; *(10)* Bourns & Worces., B. Menage Exped. 1894, 35; *(11)* Blanf., Faun. Br. Ind. B. III, 1895, 211; *(12)* M. & Wg., Abh. Mns. Dresden 1896, Nr. 1, pp. 1, 4; *(13)* Grant, Ibis 1896, 559.

b. **Cuculus strenuus** *(1)* Gld., P. Z. S. 1856, 96; *(II)* id., B. Asia VI, pl. 42 (1862).

c. **Hierococcyx strenuus** *(1)* Cab. & Heine, Mus. Hein. 1862, IV, 28; *(2)* Everett, J. Str. Br. R. A. S. 1889, 171.

For further synonymy and references cf. Shelley *7*.

Figures and descriptions. Gould *a II, b II*; David & Oustalet *a 3*; Oates *4*; Shelley *7*; Taczanowski *8*; Blanford *11*; etc.

Young. Above blackish brown, the feathers edged and obscurely barred with tawny-olive, more buff-brown, streaked with blackish brown on hind neck; head above very dark grey, ear-coverts rather lighter, lores whitish; tail grey-brown with three exposed blackish bands and two under the upper tail-coverts, tip brownish white; under parts white, washed with buff, becoming buff-brown on flanks, the whole broadly striped with blackish brown, taking a more sagittate form on the flanks; chin blackish; remiges below dusky, barred with light clay-buff: "feet yellow; eyelids and iris yellow; bill black, below greenish". — Wing 234 mm; tail c. 200; tarsus 25; bill fr. nostr. 16.5. (♀, Gunong Masarang, N. Celebes, 16. IX. 94: P. & F. Sarasin.)

Adult. "Has the lores whitish; crown, nape and sides of head and neck ashy, varying from rather pale to blackish, passing into the colour of the back which with the remainder of the upper parts is rich brown with a purplish gloss; quills barred with white on the inner webs; tail above brown, pale brownish grey below, tipped with white or rufous white, and crossed outside the coverts generally by 3, sometimes by 4, black or dark brown bands, the last the broadest, and the last but one the narrowest and separated from the last by a narrow space; beneath the chin is dark ashy, with a white moustachial stripe on each side; throat white, more or less streaked with ashy and rufous and passing into the more rufous upper breast, which also has ashy shaft-stripes; lower breast, flanks and abdomen white, more or less suffused with rufous and transversely banded with brown; vent, lower tail-coverts and edge of wing white" (Blanford *11*).

Measurements. Wing 216—254 mm; tail 210—235; tarsus 26.8; bill from gape 35.6 (Blanford *11*).

Eggs and breeding habits. According to observations by Miss Cockburn in the Nilghiris *(6)* this Cuckoo builds its own nest of twigs like a Crow's and hatches its eggs. These are three in number, white, with a few touches (sometimes wanting) of light brown. A similar observation by Mr. R. H. Morgan, the nest containing 4 eggs, is recorded

(6). Mr. Hodgson observed the young of this species being fed by other birds, and states that it is parasitic in its breeding-habits *(6)*.

Distribution. India, S. E. Siberia, and China, south to Malacca *(7, 8, 11)*; Philippines — Luzon (fide Gould *b 1, 7*), Calamianes (Bourns & Worcester *10*), Palawan (Platen *c 2*), Negros (Whitehead *13*); Labuan (Treacher *c 2*); Java (Diard in Schl., Mus. P.-B. Cuculi 1864, 15); Minahassa, Celebes (P. & F. Sarasin *12*).

A single immature specimen of this Cuckoo, described above, was obtained in North Celebes by the cousins Sarasin in September, 1894. It is probably only a rare winter visitor to the island from China or S. E. Siberia, where David *(a 3)* and Godlewski *(8)* remark upon its presence in summer. Few specimens have as yet been obtained in other parts of the Archipelago.

It is distinguishable from *H. crassirostris* by its having the wing below banded (except towards the tip), as well as more pointed and longer, the bill smaller, the 3 exposed bands on the middle tail-feathers all complete; the banded wing also serves to distinguish it from *H. fugax*, as well as its larger size.

60. HIEROCOCCYX FUGAX (Horsf.).

Horsfield's Hawk-cuckoo.

a. **Cuculus fugax** *(1)* Horsf., Tr. L. S. 1821, XIII, 178 (Java).

b. **Cuculus lathami** *(1)* J. E. Gray, Ill. Ind. Zool. 1834, pl. 34, fig. 2.

Hierococcyx fugax *(1)* Bp., Consp. 1850, I, 104; *(2)* Cab. & Heine, Mus. Heine 1862, IV, 28 (Hiracococcyx); *(3)* Salvad., Cat. Ucc. Borneo 1874, 65 (Hieracococcyx); *(4)* id., Ann. Mus. Civ. Gen. XIV, 1879, 185; *(5)* Hume & Davison, Str. F. VI, 1878, 157; *(6)* Kelham, Ibis 1881, 391; *(7)* Wrdl. Ramsay, ib. 1884, 333; *(8)* A. Müller, J. f. O. 1885, 157; *(9)* Büttik., Notes Leyd. Mus. 1887, 28; *(10)* Sharpe, P. Z. S. 1887, 442; *(11)* id., Ibis 1890, 10; *(11bis)* Everett, J. Str. B. R. A. S. 1889, 171; *(12)* Shelley, Cat. B. XIX, 1891, 236; *(13)* Styan, Ibis 1891, 325, 484; *(14)* Salvad., Ann. Mus. Civ. 1891, XXXII, 45; *(15)* Baldamus, Leben europ. Kuck. 1892, 133; *(16)* Hagen, T. Ned. Aard. Genoots. 1890 (2) VII, 136; *(17)* Bourns & Worces., B. Menage Exped. 1894, 35.

c. **Cuculus hyperythrus** *(1)* Gld., P. Z. S. 1856, 96; *(II)* id., B. Asia 1856, VI, 431 (Shanghai); *(2)* David & Oust., Ois. Chine 1877, 64.

d. **Hierococcyx pectoralis** *(1)* Cab. & Heine, Mus. Hein. 1862, IV, 27 (Philippines); *(2)* Wald., Tr. Z. S. 1875, IX, 161; *(3)* id., P. Z. S. 1878, 946; *(4)* Steere, List Coll. B. Philip. Is. 1890, 12.

e. **Hierococcyx sparveriodes** *(I)* Schrenck (nec Vig.), Reis. Amurlande, Vög. 1859, 257, pl. 10.

f. **Hierococcyx hyperythrus** *(1)* C. & H., Mus. Hein. 1862, IV, 30; *(2)* Wrdlw. Ramsay, Ibis 1886, 157; *(3)* Seebohm, B. Japan. Emp. 1890, 171.

g. **Cuculus asturinus** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 101; *(2)* W. Blas., J. f. O. 1883, 153.

Figures and descriptions. Gould *c II*; J. E. Gray *b I*; Schrenck *e I*; Brüggemann *g 1*; Blasius *g 2*; W. Ramsay *f 2*; Shelley *12*.

Female, not quite fully adult. Above slaty grey, some feathers round neck white, the longest scapulars white barred with ashy; primaries slaty black, tipped with a narrow rim of white; some of the secondaries blackish brown, barred with rufous; upper tail-coverts blackish brown, tipped with rufous brown; tail-feathers rufous brown

crossed with 5 black bars, the subterminal one much the broadest; in front of eye white; chin slaty grey; under surface white, chest washed with rufous, breast and sides streaked here and there with brown; under wing-coverts white with a few streaks of brownish; quills below shining dusky, barred on the inner webs — except towards free end of wing — with white, which gradually increases in extent until at their bases the quills are all white. Wing 200 mm; tail 160; tarsus 22; mid. toe without claw 23; bill from nostril 16.

"Bill black, below yellow-green; orbit yellow-green; feet light yellow; iris brown" (Platen in Mus. Nehrkorn, specimen from Rurukan, N. Celebes, 28. I. 85).

Adult. Uniform slaty grey above.

Young. Upper surface barred all over with rufous and brown (except head, which is getting smoky grey); tail, tail-coverts and secondaries as in the above-described ♀; under surface strongly washed with rufous and marked with broad streaks of rich brown (♀ Mindoro; Platen in Mus. Nehrkorn, Nr. 2485).

Distribution. Lower Amoor (Maack *e I*); Japan (Seebohm *f 3*); China (Gld. *c 1*, *c II*, Styan *13*); Philippines (Cabanis *d 1*, Everett *d 3*, Maitland-Heriot *f 2*, Steere *d 4*, B. & W. *17*); North Celebes — Gorontalo (Riedel *g 1*); Rurukan (Platen in Mus. Nehrk.); Borneo (Everett *11bis*, *11*, Fischer, Schwaner *3bis*, *11*); Java (Horsf. *a 1*); Sumatra (Beccari *4*, Klaesi *9*, Modigl. *14*); Singapore (Kelham *6*); Perak, Malacca (Wray *10*); Salanga (A. Müll. *8*).

In his Catalogue of the Cuckoos *(12)* Capt. Shelley includes under the title *Hierococcyx fugax* three forms, *H. fugax*, *H. hyperythrus*[1]) and *H. nisicolor*, which have been commonly treated by other authors as distinct. According to Major Wardlaw Ramsay *H. hyperythrus* has the "rufous (of the under surface) darker, uniform, or nearly so", inhabits Japan, Amoorland, China, and the Philippines, the young birds being found in Borneo and Malacca, and perhaps Sumatra and Java in winter; *H. nisicolor* has the "rufous paler, mixed with white" and ranges from the Himalayas to Tenasserim, descending perhaps into the Malay Peninsula; *H. fugax* is a species which in maturity retains a plumage like *H. hyperythrus* juv.; its distribution is not definitely stated *(f 2)*. We conclude that a stationary race breeding in the East India Islands is intended; but, if so, Major Ramsay is in error in applying to it the name *H. fugax* Horsf,, since that bird has a grey, not a brown, back *(a 1)*. Capt. Shelley finds the type to be an adult of the large series of examples comprehended by him under the title *H. fugax*, a grey-backed species when adult, under which the types of *H. nisicolor* and *hyperythrus* are also included.

Not taking into further consideration *H. nisicolor*, of which Hume & Davison say that "of course it cannot be confounded with *fugax* which has a very much longer bill" *(5)* and the distinctness of which is upheld by Blanford in his recent work, it appears to us highly probable that Major Ramsay's opinion as to the distinctness of *H. hyperythrus*, subspecific at least, from *H. fugax*, the resident form of the East Indies, is correct. Mr, Everett discovered *H. fugax* breeding on Kini Balu: "I found this species laying in the nest of *Culicicapa ceylonensis* on the 29th April. The

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[1]) The type of *C. hyperythrus* in the British Museum is labelled Manila.

egg was creamy white, slightly spotted with pale yellow-brown and grey, forming a complete zone at the larger end: axis 0.9 inch, diam. 0.65" *(11)*. Major Ramsay appears, however, not to be in the right in holding the resident form to be a brown-backed species when adult, resembling the young Chinese birds; although Dr. Sharpe l. c. does not mention whether Mr. Everett's adult specimens had grey backs, it appears that they had, since there are such specimens from him, and other collectors in Borneo, in the British Museum *(12)*, as shown in Shelley's series. We do not of course venture to separate in any way this stationary form from *H. hyperythrus*, without examining more material than the one or two specimens consulted by us, but desire to call attention to the fact that a certain Cuckoo visits Amoorland, Japan and China in summer, passing over, but not remaining in the Lower Yangtse Basin in migration, as Mr. Styan believes *(13)* — which may, or may not, be identical with one known to breed in Borneo. In any case a new and close comparison would be desirable, as the questions of migration and the differentiation of new forms are interestingly involved in such cases as this.

Only two specimens of this species are as yet known to us from Celebes. The first was named as a new species, *C. asturinus*, by Brüggemann, but Prof. W. Blasius, after a careful examination of the type, came to the conclusion that it is identical with *C. hyperythrus* and *fugax* (see: *g 2*). The second is the female kindly lent to us by Mr. Nehrkorn and described above. It was shot at Rurukan (3000 ft.) in the Minahassa in January 1885 by Dr. Platen, and was most likely a migrant individual from Japan or China.

GENUS CUCULUS L.

In the true Cuckoos the bill is moderate, the nostrils round, in a slightly tubular formation of skin; the wing is long and pointed, the secondaries only about $^1/_2$ the wing-length; the feathers of the rump and upper tail-coverts very thick, the latter about $^3/_5$ the length of the tail; tail graduated; feet delicate, yellow in colour (except in *C. pallidus* (Lath.) and *sonnerati* Lath). Ten species are recognised by Shelley (1891), inhabiting Europe, Africa, Asia, Australia.

61. CUCULUS CANORUS (L.).

Common Cuckoo.

The races of the Common Cuckoo appear to be two or three in number, one of which, a somewhat small Eastern one, occurs in Celebes and other islands of the East Indies probably on migration. Two races of *C. canorus* are:

+ 1. The typical Cuculus canorus.

a. **Cuculus canorus** Linn., S. N. 1766, I, 168; Dresser, B. Europe V, 1878, 199, pl. 299; Shelley, Cat. B. XIX, 1891, 245; etc.

For synonymy see Shelley l. c.

Distribution. Europe, N. Africa, Asia as far east as India, migrating in winter south to the Cape, S. Persia, S. India, as a straggler — Ceylon.

Diagnosis. Larger, wing 203—226 mm (8.0 in.—8.9 in., Legge, B. Ceylon 222); the bars on the under surface usually a very little narrower.

2. Cuculus canorus canoroides (S. Müll.).

b. **Cuculus canorus** *(1)* Horsf., Tr. Z. S. 1821, XIII, 179 (Java); *(1bis)* Wald., Tr. Z. S. 1872, VIII, 115, pt. (Celebes); *(2)* Swinh., P. Z. S. 1871, 395 (China); *(3)* Hartl. & F., P. Z. S. 1872, 100 (Pelew); *(4)* Finsch, J. Mus. Godef. 1875, VIII, 12 (Pelew); *(5)* Hume, Str. F. 1875, III, 78 (Pegu); *(6)* id., Str. F. 1876, IV, 288 (Andamans and India); *(7)* David and Oust., Ois. Chine 1877, 65 (China); *(8)* Finsch, P. Z. S. 1879, 12 (Duke of York Id.); *(9)* Oates, B. Brit. Burmah 1883, 103 (Burmah); *(10)* Styan, Ibis 1887, 230; 1891, 325, 484; *(11)* Seebohm, B. Japan. Emp. 1890, 169 (Japan); *(12)* Shelley, Cat. B. 1891, XIX, 245, pt. (Japan, New Guinea, etc.); *(13)* Baldamus, Leben europ. Kuck. 1892, 17, 18 (? Celebes); *(14)* Seebohm, Ibis 1893, 51 (Loochoo Is.); *(15)* Hose, t. c. 414 (Sarawak); *(16)* Bourns & Worces., B. Menage Exped. 1894, 35.

c. **Cuculus canoroides** *(1)* S. Müll., Verh. Natuurk. Comm. 1839—44, 235 (in part?); *(2)* Gld., Handb. B. Austr. 1865, I, 614; *(3)* Blyth, Ibis 1865, 31, 40; *(4)* Salvad., Orn. Pap. 1880, I, 328; Agg. 1889, 48, and 1891, 217; *(5)* W. Blas. & Nehrk., Verh. z.-b. Ges. Wien 1882, 417; *(6)* W. Blas., J. f. O. 1883, 115; *(7)* Pleske, Bull. Acad. Petersb. 1884, 116; *(8)* Guillem., P. Z. S. 1885, 565, 624; *(9)* W. Blas., Ornis 1888, 306, 565; *(10)* id., Ibis 1888, 373; *(11)* id., J. f. O. 1890, 145; *(12)* Whitehd., Ibis 1890, 46.

d. **Cuculus optatus** *(1)* Gld., P. Z. S. 1845, 18; *(II)* id., B. Austr. 1848, IV, pl. 84; *(3)* Baldms., Leben europ. Kuck. 1892, 127 (pt.?).

e. **Cuculus canorinus** *(1)* ? Cab. & Heine, Mus. Hein. 1862, IV, 35; *(2)* Salvad., Cat. Ucc. Borneo 1874, 67; *(3)* ? Tacz., J. f. O. 1881, 186; *(4)* ? Deditius, J. f. O. 1886, 540; *(5)* Everett, J. Str. Br. R. A. S. 1889, 169; *(6)* Baldamus, Leben eur. Kuck. 1892, 126.

f. **Cuculus striatus** *(1)* Swinh. (nec Drapiez), Ibis 1861, 259, 340 (in part); ? *(2)* David & Oust., Ois. Chine 1877, 65.

g. **Cuculus intermedius** (nec Vahl) *(1)* Seeb., B. Japan 1890, 169 partim?; *(2)* M. & Wg., J. f. O. 1894, 241; *(3)* iid., Abh. Mus. Dresd. 1895 Nr. 9, p. 3; *(4)* Hartert, Nov. Zool. 1896, 159, 176, 552.

"**Dandape**" (ad.) or "**Parapaa**", "**Mengantagota**" (juv.) Talaut, Nat. Coll.

Distribution. ? East Siberia *(e 3, e 4)*; China (Swinh. *b 2*, David *b 7*); Japan *(b 11, b 12)*; Burmah (Hume *b 5*, Oates *b 9*); India (Hume *b 6*); Andamans (Hume *b 6*); Philippines (Platen *c 9*, *c 11*, B. & W. *b 16*); Borneo *(c 4, e 5)*; Great Sangi (Platen *c 9*); Talaut Is., Karkellang and Kabruang (Nat. Coll. *g 2*, *g 3*); Celebes — North (Meyer *b 1bis*); South (Everett *g 4*); Saleyer, Djampea and Kalao (Everett *g 4*); Bali (Doherty *g 4*); Pelew Is. (Heinsohn *b 3, b 4*); Halmahera, Ternate, Batchian, Morty, Amboina, Waigiou, Aru, New Guinea, Jobi, Duke of York Id., New Britain, N. Australia (Salvad. *c 4*, Shelley *b 12*); Malacca, Singapore, Java, Dahat Id., Timor (Shelley *b 12*).

Diagnosis. Smaller, wing 190 (or less) to 220 mm (specimen in Coll. Salvad. *c 4*); the bars on the under surface usually broader and blacker; wing below with one or two fewer white bars.

Adult. Above slate-grey, paler on sides of face, throat and breast; wings shining dusky brown; tail black, browner on basal part; marked at intervals of about 1.5 cm with small white spots at the side of the shaft, growing larger towards the outer feathers where they are in displaced juxtaposition, tip of tail white; under surface of body buffy white, darkest on under tail-coverts, marked with transverse bars of blackish sepia (except on under tail-coverts which are transverse-spotted) of about 2 mm breadth; quills below barred with white on basal two-thirds, the inner ones uniform white at the base (ad. Karkellang, Talaut, Autumn 1896; Nat. Coll. C 15302).

Young. Upper surface unevenly barred with rufous brown and black, the brown bars also well developed on the tail and as notches on either web of the quills above; below white, washed with cinnamon about the throat and chest, and barred all over with sepia (Karkellang, Sept. 1896, C 15304).

Second year. On moulting the rufous plumage, the bird assumes a dress resembling that of the adult, but browner and darker, all the feathers of the upper parts being edged with whitish (Talaut Is. C 15300, Autumn 1896; C 13080 and C 13787, Nov. 1894 — three specimens in transition-plumage).

Eggs. Elongated oval, a shade narrower at one end; ground-colour pure white, with a slight gloss, very sparsely marked, chiefly towards the larger end, with minute speeks and tiny lines of dingy olive-brown and very pale inky purple or purplish grey. 22.6 × 15.2 mm (Oates).

Measurements.	Wing	Tail	Tarsus	Bill from feathers of forehd.
a. (C 1857) Manado (March)	201	170	20	—
b. (C 1860) Manado (March)	195	165	19	16

In summer the Common Cuckoo, *C. canorus*, is spread from the British Islands to East Siberia, China and Japan, varying so little that the majority of ornithologists speak of birds from the East, as from the West, simply as *C. canorus*. South-eastern examples, however, run a little smaller in size and are slightly different in the markings on the under surface. Hume seems to have first recognised the presence in India of two races of the Cuckoo in the small and large individuals which occur there in winter: speaking of a specimen from the Andamans he says: it "is precisely similar to a great number of others that I have obtained in India, and which in common with most other Indian ornithologists I have always called *canorus*. These specimens differ only from others obtained in India, and from European ones, in their slightly smaller size, and possibly a shade slenderer bills" *(b 6)*. The first specimen from Pegu, brought to notice by Hume *(b 5)*, was also undersized, and Oates finds likewise that birds of smaller size (wing 8 in.) than the European Cuckoo, but not otherwise differing, are the rule there *(b 9)*. As in India, they appear, says Mr. Oates, to be merely winter visitors to Burmah, though a few may breed there. In China, as Swinhoe, David, and Styan remark, the Cuckoo is a summer visitor, and it is most probable that birds from there, or from the territories rather further north, are those which pass into Burmah in winter. It should be noticed that neither David & Oustalet in Chinese specimens, Seebohm in Japanese ones, nor Shelley in those of either country, find differences between

them and European specimens *(b 7, b 11, b 12)*, though Styan *(b 10)* has since remarked that "the common Cuckoos of Kiukiang are nearly all of a small pale race, with very narrow bars on the under parts". Hume and Oates also treat of them under the name *C. canorus*, and it may be doubted whether an attempt to discuss under a separate trinomial so slight a departure from the typical form is well advised. In the East India Islands, Salvadori and other naturalists carefully hold the eastern form apart under the name *canoroides*, though the Italian ornithologist at the same time calls attention to its very close resemblance to the typical form.

Capt. Shelley (Cat. B. XIX, 252) identifies what Count Salvadori appears to us to call *C. canoroides* with a different species, "*C. intermedius* Vahl"; and Salvadori (Orn. Pap., Agg. 1891, 217) apparently acquiesces in this determination, overlooking the fact that Shelley catalogues several specimens of *C. canorus* from his own especial province, the Moluccas and New Guinea, as well as several of "*C. intermedius*". From Salvadori's remarks we conclude that he was in possession of specimens of the small south-eastern race of the former bird only. "*C. intermedius*", according to Mr. Blanford (Faun. Br. Ind., B. III 1895, 208) — here called *C. saturatus*, — may be distinguished in adult plumage from *C. canorus* by the much darker upper parts, "pure blackish ashy"; the edge of the wing pure white; the size always smaller and the bill a little stronger.

Shelley speaks of the bars as "jet-black"; in *canorus* as "more dusky". The bars on Salvadori's *canoroides* are dusky ("nigricans"), and very little broader than in the *typical canorus*, and the wing 200 mm, in one case 220 mm, as in a good-sized specimen of *C. canorus*.

To the differences pointed out by Oates and Blanford it may be added that "*C. intermedius*" (Shelley, partim) appears to have a very distinct cry. Colonel Tytler (Ibis 1868, 202, under *C. himalayanus*) speaks of it as a peculiar call of "Goog, goog, goog", as heard by him between Simla and Mussurie; Seebohm, who shot the bird in Siberia, as "a guttural and hollow-sounding "hoo" (Ibis 1878, 326); Major Marshall saw the bird (called *C. himalayanus*) as it was uttering "the deep booming notes sounding something between the notes of the Hoopoe and Green Pigeon" (Ibis 1884, 410). Swinhoe's *C. monosyllabicus* (Ibis, 1865, 545), with a cry "like the two notes of *canorus* run into one", is probably the same; but the species spoken of by Major Scully as *C. striatus* (Str. F. 1879, VIII, 254) would appear from its cry rendered by the natives of Nepaul as "Kaifal pakyo" to be *C. micropterus* Gould, whose note according to Oates resembles the word "bho-kutha-kho".

The form, with the monosyllabic call, should, apparently, as Mr. Blanford shows, be called *Cuculus saturatus* Hodgs. It has been supposed to occur in Celebes, but we believe erroneously, the eastern form of *C. canorus*, which visits the East Indies in winter, having been confused with it.

As to *C. canorus* itself, we incline to the opinion that there are two eastern races of it, a more northern one, pale and with narrow bands below, inhabiting Siberia and (wintering in ?) China (see Styan, *supra*, and Taczanowski, "Faune Orn. Sib. Orient." 1893, II, 685 — here called *C. canorus borealis* (Pall.)), and a race with broader, blacker bands, *C. canorus canoroides*, the subject of the present article, which visits the East Indies in winter and probably inhabits more southern latitudes than *C. c. borealis* in summer. This view seems to coincide with the opinion of Mr. Hartert, who has most kindly looked into the question for us and, after carefully examining the material at Tring and seeing that in the British Museum, informed us that the birds from South Celebes, Talaut, and the Lesser Sunda Islands "cannot, I think, be the eastern *C. canorus*". They are, we believe, the more south-eastern, *C. c. canoroides*.

The following data apparently show that the Common Cuckoo occurs only as a winter migrant in the East Indies south of the Philippines, though the facts to hand are insufficient and the collecting season varies in different localities.

Japan: Summer visitor (Seebohm *b 11*).
China: Summer visitor (Swinh. *f 1*, *b 2*, David *b 7*, Styan *b 10*).
India: Winter (Hume *b 6*).
Andamans: Nov. 16th (Hume *b 6*).
Burmah: Aug. to Feb. (Oates *b 9*).
Philippines — Mindanao: 1 in summer 1889 (Platen *c 11*).
Borneo: "Occurs on migration on the coast" (Hose *b 15*).
Talaut Island: 11 specimens, Autumn (Nat. Coll. in Mus. Dresd. & Tring).
Great Sangi: Jan. 25th (Platen *c 11.*).
Celebes: March and April (Meyer and Nat. Coll., Dresd. Mus.).
Ternate: Oct., Nov., Dec. (Bruijn *c 4*, Fischer *c 7*).
Amboina: Nov. (Bruijn *c 4*, Platen *c 5*).
Waigiou: Oct., Nov. (Guillem. *c 8*).
Aru: Dec. (Guillem. *c 8*).
New Guinea: Sept. 18th 1877 (D'Alb. *c 4*).
New Britain: "The eastern representative of our European Cuckoo was repeatedly observed and collected by me from November till January, as well as in New Britain as round about Cape York" (Finsch, *C. cuculoides*, Mitth. Orn. Ver. Wien 1884, 92; Vög. Südsee-Inseln 1884, 12).
? North Australia: Jan. (Gould *d II*, *c 2*).

On the breeding of the *Cuculinae* compare the articles on *Eudynamis melanorhyncha* and *Cuculus saturatus*.

+ 62. ? CUCULUS SATURATUS Hdgs.

Himalayan Cuckoo.

a. **Cuculus intermedius** *(1)* Seeb. (nec Vahl), B. Japan 1890, 169, pt.?; *(2)* Oates, Hume's Nests and Eggs Ind. B. 1890, II, 381; *(3)* Shelley, Cat. B. XIX, 1891, 252, partim; *(4)* Wiglesw., Av. Polyn. 1894, 10, partim; ? *(5)* Büttik., Zool. Erg. Weber's Reise 1893, III, 275; *(6)* Oust., Nouv. Arch. du Mus. 1893, 136.

b. **Cuculus striatus** "Drapiez"[1]) *(1)* Schl., Mus. P.-B. Cuculi 1864, 7, ? partim; *(2)* Swinh., P. Z. S. 1871, 395 ?; *(3)* Hume, Str. F. 1874, 190; *(4)* Oates, B. Br. Burmah 1883, II, 105; *(5)* id., Ibis 1889, 355—359; *(6)* Everett, J. Str. Br. R. A. S. 1888, 170.

c. **Cuculus himalayanus auct.** (nec Vigors, P. Z. S. 1831, 172 — fide Blanford *1, 2*).

d. **Cuculus monosyllabicus** *(1)* Swinh., Ibis 1865, 545.

e. **? Cuculus peninsulae** *(1)* Stejn., Bull. U. S. Nat. Mus. Nr. 29, 1885, 227.

Cuculus saturatus Hodgson, *(1)* Blanf., P. Z. S. 1893, 315—319; *(2)* id., Faun. Br. Ind. B. III, 1895, 207.

Descriptions. Oates *b 5*; Blanf. *2*.

Adult. When similar to *C. canorus*, except that the upper parts are much darker, pure blackish ashy, the lower parts are generally pale buff with the black bands broader and more regular, and the edge of the wing pure white. The size is always smaller, and the bill a little stronger. The young pass through two stages, in neither of which is there a white nuchal spot" (Blanford).

Changing plumage. In the first plumage the back is blackish with white margins, in the second blackish, barred with dark rufous (Oates & Blanf). We have two specimens from Talaut in such a "first" plumage, which are evidently passing directly into the adult dress, the grey feathers of that plumage being intermixed with the others on the head, neck, and throat. We have described these as second-year birds in the former article.

In their rufous stage Mr. Oates distinguishes *C. canorus* as being pale rufous; *C. saturatus* dark rufous, with coarse bars; *C. poliocephalus* chestnut, delicately barred.

Distribution. East Siberia from the Yenesei ? (Seebohm *a 1*) to Kamtschatka ? (Stejneger *e 1*); China (Swinh. *b 2*); Setchuan (Oust. *a 6*); ? Japan (Seebohm *a 1*); India (Oates *b 4*, Blanf. *2*); Pegu and Tenasserim (Oates *b 4*); Andamans and Nicobars (Davison *b 3*, R. G. W. Ramsay *a 3*, Oates *a 2*); ? Sumatra (Shelley *a 3*); ? Java (Shelley *a 3*, Schl. *b 1*); Borneo (Everett *b 6*, Schl. *b 1*); ? Philippines (Shelley *a 3*); ? Pelew Islands (Hartl. & Finsch *a 4*); ? Celebes — Manado (Shelley *a 3*) — Macassar (Wall. *a 3*, Weber *a 5*); ? Batchian, Morty, Flores, Timor, New Guinea, N. Australia (Shelley *a 3*).

We include this form of Cuckoo doubtfully in the Celebes avifauna on the authority of Capt. Shelley, and Mr. Büttikofer; Shelley notes 3 specimens in the British Museum from Manado and one from Macassar, as well as one specimen of the Common Cuckoo, *C. canorus*, also from Manado. These four Manado specimens are from the Tweeddale Collection, presumably the identical four from Meyer mentioned by Lord Walden (Tr. Z. S. 1872, VIII, 115), who remarks that "without the example in full plumage it would have been difficult to say whether the other three did not belong to *C. canoroides* Müller". Shelley now finds them identical with the form he terms "*C. intermedius*", and a specimen obtained by Prof. Weber at Macassar is likewise found to be "*C. intermedius*" by Büttikofer, though what "*C. intermedius*" is we confess we do not know. It seems to be composed of *C. saturatus* and of two races of *C. canorus*. Notwithstanding its near affinity to *C. canorus*, numerous observers — Swinhoe, Seebohm, Marshall, Tytler, Kittlitz, David — agree in

[1] Not of Drapiez, according to Seebohm *(a 1)* and Blanford *1*.

finding that *C. saturatus* has a different cry, a note which may be syllabilised as "hoo", resembling somewhat the cry of the Hoopoe.

"Like all the Cuckoos", says Swinhoe *(b 3)*, "these birds in China are only summer visitants", an observation confirmed by David *(b 5)*, and by Godlewsky in the Baikal country, Dauria, Ussuriland and the coasts of the Sea of Japan. So, likewise, according to Seebohm, it — if indeed this species is intended — visits all the Japanese Islands in summer. It is known as a breeding bird in the Himalayas, but in no other part of India as far as Mr. Oates is aware *(2)*; in the winter it visits the low-lying Lucknow division (Reid, Str. F. 1887, X, 451), and Mr. Oates considers that it is probably only a winter visitor to Pegu and Tenasserim *(a 6)*. Davison *(a 4)* did not hear it in the Andamans in December and January, but first noticed its cry on March 14th in the Nicobars; probably, we should think, like *C. canorus*, only the male utters this cry in the breeding season, for there are specimens from the Andamans in the British Museum obtained in December, January and February *(4)*. Here, therefore, also it would appear to be a winter visitant.

Schlegel records the dates of 12 specimens ascribed to *C. striatus* killed in the Moluccas and Timor in the winter months; it appears, therefore, that part of the birds, which visit China, Japan and Siberia in summer, make their way to these islands in winter. Nevertheless some, apparently, remain in the East Indies and even breed there; one of Schlegel's specimens (Nr. 44) is dated "Ternate May 1st 1861", another is a "young one, with red bands, taken from the nest in Java (voyage of S. Müller, Nr. 30)". The following note of Mr. de Bocarmé suggests that it is in the mountains, not in the plains, of Java that the species breeds: "In February and in March this Cuckoo descends in Java from the mountains; it is to be found in the bushes and even in the Rhizophores by the sea-shore. The male is then mute. It is during these two months that this species moults; at a height of more than seven thousand feet and thereabouts, in a European temperature, every part of the forest resounds with the voice of this bird, which is never to be heard but when perched on the top of the highest trees" *(b 2)*.

C. saturatus is parasitic in its habits, but Capt. Hutton, writing in Hume's "Nests and Eggs of Indian Birds" *(2)*, says that "when the young bird is old enough to leave the nest, the foster-parents feed it no longer, and it is then supplied by the old Cuckoo, or at all events by one of the same species. This I have myself repeatedly witnessed . . . . . At Jeripance, below Mussurie, I have seen the young Cuckoo sitting for hours together on a branch waiting for the return of the adult bird, which continued every now and then to bring supplies of caterpillars wherewith to satisfy the apparently insatiable appetite of the nestling, until at last both would fly off to another spot. To satisfy myself that it was really this Cuckoo that fed the young, I shot one in the very act, and found it to be no other than our summer visitant, *Cuculus intermedius*."

Notwithstanding the careful work of Mr. Oates *(b 7)*, the present Cuckoo is most unsatisfactorily understood owing to the great difficulty of distinguishing the supposed species or subspecies, and a fresh comparison of the Himalayan birds should be made with those of China, Japan and the N.W. parts of the East Indies.

GENUS CHRYSOCOCCYX Boie.

Small Cuckoos of about the size of a Sparrow, easily recognised by the metallic green, bronze, or coppery on the upper parts, and, when barred, on the bars of the under parts. The bill and feet are dark in colour — grey, brown, leaden, or blackish; the wing is rather pointed, the secondaries falling short of the tip by about $^1/_3$ the wing-length, the first primary is rather short, about $^1/_2$ the length of the second. The African species — 4 in number — have the under surface of the wing barred and are separated from those of India, the East Indies, Australia, and New Zealand by Capt. Shelley, the latter forms having a single oblique band across the wing below *(Chalcococcyx)*.

♀ 63. CHRYSOCOCCYX MALAYANUS (Raffl.).

Little Bronze Cuckoo.

a. **Cuculus malayanus** *(1)* Raffles, Tr. L. Soc. 1822, XIII, 286.
Chrysococcyx malayanus *(1)* Horsf. & Moore, Cat. B. Mus. E. I. Co. 1856—58, 706.

b. **Chrysococcyx minutullus** *(1)* Gould, P. Z. S. 1859, 128; *(II)* id., B. Austr. Suppl. 1859, pl. 56.

c. **Lamprococcyx minutullus** *(1)* Cab. & Hein., Mus. Hein. 1862, IV, 15, note; *(2)* Gld., HB. B. Austr. 1865, I, 625.

d. **Chrysococcyx basalis** *(1)* Salvad., Cat. Ucc. Borneo 1874, 62, partim; *(2)* Sharpe, Tr. L. Soc. 1877, (2) I, 320; *(3)* W. Rams., Tweedd. Orn. Works Index 1881, 656; *(4)* ? Steere, List Coll. B. & M. Philipp. Is. 1890, 12.

e. **Chalcococcyx malayanus** *(1)* Wald., P. Z. S. 1878, 945; *(2)* Shelley, Cat. B. XIX, 1891, 298; *(3)* Sharpe, Ibis 1894, 247, 258; *(4)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 1, p. 8; *(5)* Hartert, Nov. Zool. 1896, 159, 572.

f. **Lamprococcyx malayanus** *(1)* Hume, Str. F. 1878, VI, 503; *(2)* North, Pr. L. Soc. N. S. W. (2) IX, 39 (1894).

g. **Chalcites minutullus** *(1)* Rams., Tab. List 1888, 15.

For further synonymy and references cf. Shelley *e 2*.

Figure and descriptions. Gould *b II*, *c 2*; Shelley *e 2*.

Adult. Above glossy bronze-green, an obscure subterminal band across the middle tail-feathers, bases of the feathers on forehead white; face and under parts white, the feathers of lores, superciliary region and ear-coverts with dark tips, the entire under parts, including the under wing-coverts barred with glossy bronze-brown; tail below with the outermost pair of rectrices crossed with four bands of black and white, next pair hazel on the inner web with three dark bars and a white spot at the tip, outer web brown, third and fourth pairs hazel on the inner web with a terminal white or whitish spot and a subterminal blackish band, passing on to the outer webs which are brown, middle pair below grey-brown, with a dark subterminal band;

remiges below grey-brown, passing on the inner webs where they rest upon the body into pale cinnamon and into white at the base; bill and feet black; "iris reddish, rim of the eyelids cherry-red" (♂, Macassar, 22. June, 1895: P. & F. Sarasin).

Young. Above browner and less glossy than the adult, the edges of some of the feathers pale; below white without bars, becoming greyer on breast and throat, and brown on sides of head; under wing-coverts and much of the inner webs of the remiges buff-white, the former slightly barred, a few sagittate bars on sides, flanks, and under tail-coverts; tail much as in the adult, but hardly a trace of bars (except the subterminal one) on the second feather from the outside (Sosso, S. W. Central Celebes, 11. Aug. 1895: P. & F. Sarasin).

Measurements (3 adults, S. Celebes). Wing 91—94 mm; tail 55—61; tarsus c. 14.5; bill from nostril 10—11.

Eggs. See North *f 2*.

Distribution. Malay Peninsula (Maingay, etc. *e 2*); Sumatra (Raffles *a 1*); Borneo (Motley, etc. *e 2*); Philippines — Mindanao (Everett *e 1*), Negros (Steere *d 2*), ? Basilan (Steere d *4*), Sooloo Is. (Everett *e 3*); Celebes — Macassar (P. & F. Sarasin *e 4*, Everett *e 5*), Indrulaman (Everett *e 5*), Sosso, S. W. Central Celebes (P. & F. S. *e 4*); Sumbawa (Doherty *e 5*); Flores and Timor (Wallace *e 2*); N. W. and N. Australia (Gould *c 2*, *e 2*, Ramsay *g 1*); New Guinea and Solomon Islands (fide Shelley *e 2*).

This Cuckoo was first found in Celebes in June and July, 1895, at Macassar by the cousins Sarasin, and again in August at Sosso in South-west Central Celebes — four examples being obtained in all; later in the same year two more were sent to the Tring Museum by Mr. Everett from Macassar and Indrulaman near the Peak of Bonthain Without making a careful comparison of specimens from other parts of the range of the species, it is not possible to form an opinion as to whether it is migratory or a resident form in Celebes. The distinction of the East Indian and Australasian forms of *Chrysococcyx* is not easy. The present species may generally be known by its small size, the wing, according to Capt. Shelley, not exceeding 97 mm, but equally small measurements may sometimes be found in other species, for instance *C. basalis*. *C. poecilurus* Gray of North Australia, New Guinea and the Moluccas is more thickly banded below, the dark bands being $^2/_3$ the width of the intervening white spaces, the second lateral tail-feather besides the subterminal band displays two spots only to represent the bars on the inner web in *malayanus;* *C. plagosus* (Lath.) has only the subterminal band on the second tail-feather, and the bands below are broader; this species is found by Shelley to inhabit Australia and parts of Papuasia. *C. basalis* (Horsf.) has recently been recorded by Mr. Hartert from South Celebes and shown to differ by the characters given below.

64. CHRYSOCOCCYX BASALIS (Horsf.).

Larger Bronze Cuckoo.

a. **Cuculus basalis** *(1)* Horsf., Tr. L. Soc. 1821, XIII, 179.
Chrysococcyx basalis *(1)* Blyth, J. A. S. B. 1846, XV, 54.

b. **Chrysococcyx lucidus** (nec Gm.), *(1)* Gould, B. Austr. 1848, IV, pl. 89.

c. **Lamprococcyx basalis** *(1)* Gould, HB. B. Austr. 1865, I, 626; *(2)* Salvad., Orn. Pap. I, 1880, 349.

d. **Chalcococcyx basalis** *(1)* Shelley, Cat. B. 1891, XIX, 294; *(2)* Hartert, Nov. Zool. 1896, 159.

For further synonymy and references cf. Salvadori *c 2*; Shelley *d 1.*

Figure and descriptions. Gould *b I*, *c 1*; Salvadori *c 2*; Shelley *d 1.*

Diagnosis. "The longer wing (this ♀ has it 97 mm long), both webs of the second rectrix from the outside being rufous for the basal two-thirds, the rather broader and paler bands of the breast, a superciliary whitish line, and a broad dark line from the eye along the sides of the neck distinguish this species without difficulty from *Ch. malayanus*" (Hartert *d 2*).

Distribution. "Australia, Aru Islands, Timor, Flores, Lombock, Java; re-occurring in Malacca" (Shelley *d 1*); South Celebes (Everett *d 2*).

A female specimen of this Cuckoo was obtained by Mr. Everett on Mount Bonthain in 1895. It had not previously been recorded from Celebes. Two of the points of difference between it and *C. malayanus* found by Mr. Hartert do not seem to us to hold good, namely the size is only that of a large example of *C. malayanus*, and a whitish superciliary stripe is found in that bird as well. The geographical distribution of the two birds is very similar, and we have noticed that nearly all the specimens in which the sex has been ascertained is male in *C. malayanus* and female in *C. basalis*!

GENUS CACOMANTIS S. Müll.

Small Cuckoos, about the size of a Lark, with long tails, usually longer than the wing, strongly graduated, the outermost feathers being from about ½ to ⅔ the tail-length; wing moderately pointed, secondaries about ⅔ the length of the wing, first primary nearly as long as the secondaries, a broad band of white across the wing seen from underneath. The genus is found in about 10 species from India to Australia and Fiji. *C. passerinus* of India is known to be parasitic.

+ * 65. CACOMANTIS VIRESCENS (Brügg.).

Rufous-bodied Cuckoo.

a. **Cacomantis sepulchralis** *(1)* Wald. (nec. S. Müll.), Tr. Z. S. 1872, VIII, 116; *(2)* Meyer, Ibis 1879, 69.

b. **Cuculus virescens** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 59.

Cacomantis virescens *(1)* Shelley, Cat. B. XIX, 1891, 274; *(II)* Meyer, Vogelskel. 1892, XVIII, p. 47, t. CLXXIII; *(3)* Büttik., Zool. Erg. Weber's Reise in Ost-Ind. 1893, III, 276; *(4)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 6; *(5)* iid., ib. 1896, Nr. 1, p. 8; *(6)* iid., ib. Nr. 2, p. 10; *(7)* Hartert, Nov. Zool. 1896, 159; *(8)* id., ib. 1897, 164.

"Burong-pangil-udjan" i. e. **"Rain-caller"** (Meyer *a 2*), or **"Burong socangge"** (Nat. Coll. in Mus. Dresd.), Malays of the Minahassa.

"Embis" (Meyer), or **"Koko imbantik"** (Nat. Coll.), Natives of the interior of the Minahassa.

"Sinde", Tonkean, E. Celebes (Nat. Coll.).

"Tokulat", Banggai, iid.

Figure and descriptions. Walden *a 1*; Brüggemann *b 1*; Shelley *1*; Meyer *c II* (skeleton); M. & Wg. *6*.

Adult. Head and hind neck greenish slate-grey, becoming greener on the upper back, and dark slaty on the rump and upper tail-coverts; wing brownish glossed with bronze-green; metacarpus white, partly concealed; tail black, glossed with purple, the tips of the feathers white, the inner webs of some of the outer ones slightly notched with white; cheeks, chin and throat grey, paler than the head; all the other under parts, including under wing- and tail-coverts, deep cinnamon-rufous; wing below with a broad white band running across the inner webs of the quills near their base (N. Celebes, between Manado and Arakan, C 10876).

Young in first plumage. Very different from the adult: above black, the feathers margined and barred with cinnamon-brownish, taking a more striate form on the head; under parts barred with white and black, the black predominating; under wing-coverts white, with a few black bars and transverse spots; remiges below dusky blackish, with a broad buff-white band across the middle of them; on the outermost quill a whitish spot only; tail black, barred or notched with cinnamon-rufous, the bars mostly not reaching down to the shaft: "iris sepia; feet above greyish, below yellowish; bill above black, below reddish grey" (♂, Kema, 27. Oct. 93, and juv. Tomohon, 30. Apr. 94: P. & F. Sarasin).

Immature in changing plumage. Half in young, half in adult dress; the adult coloration prevails on the under surface, though the rufous is browner and on the breast some of the feathers show vermiculate bars, often obscure; wings as in the young; head, back and tail with adult and young feathering mingled together (E. Celebes, V.—VIII. 95: C 14437).

The young of *C. virescens* is easy to distinguish from that of *C. merulinus* by the under side of the wing, which is notched with rufous-cinnamon all along the inner webs in the latter; the predominating colour of the former is dusky black, of the latter cinnamon.

Measurements.	Wing	Tail	Tarsus	Bill from nostr.
a. (C 10876) ad. near Manado, VIII.—IX. 92	115	138	16	10.5
b. (C 1865) ad. Manado, III. 71	111	136	14	—
c. (C 1866) ad. Manado, III. 71	118	—	17	—
d. (10875) ad. near Manado, VIII.—IX. 92	111	132	16	—
e. (C 5185) imm. Manado	112	134	15	18
f. (C 5184) imm. Manado	111	124	16	11
g. (C 14695) ad. Banggai, V.—VIII. 95	106	128	13.5	10.5
h. (Sarasin Coll.) ♂, Tomohon, 16. IV. 94	122	143	—	11
i. (Sarasin Coll.) ♂, Kema, 15. IX. 93	108	127	—	11
j. (Sarasin Coll.) imm., Kema, VIII. 93	107	130	—	—
k. (Sarasin Coll.) ♂, Mapane N. Centr. Cel., 28. II. 95	109	130	—	11
l. (Sarasin Coll.) ♂, Loka, S. Cel., 8. IX. 95	114	130	—	11

Skeleton.

Length of cranium	35.4 mm	Length of tarso-metatarsus	15.6 mm
Greatest breadth of do.	15.0 »	Length of digitus III	18.0 »
Length of humerus	23.0 »	Length of sternum	20.0 »
Length of ulna	23.3 »	Greatest breadth of do.	15.0 »
Length of radius	22.0 »	Height of crista sterni	8.0 »
Length of manus	23.0 »	Length of coracoideum	16.0 »
Length of metacarpus	12.0 »	Length of scapula	19.0 »
Length of digitus princ.	11.5 »	Length of clavicle	18.0 »
Length of femur	15.7 »	Length of pelvis	25.0 »
Length of tibia	25.5 »	Greatest breadth of do.	15.0 »
Length of fibula	7.0 »		

Distribution. Celebes: — Minahassa (Wallace *c 1*, Meyer *a 1*, *a 2*, Fischer *b 1*, etc.); Mapane, N. Centr. Celebes (P. & F. S.); Luwu, S. Centr. Celebes (Weber *3*); Tonkean, E. Celebes (Nat. Coll.); Banggai (Nat. Coll.); S. Celebes (P. & F. S. *6*, Everett *7*); W. Celebes, Tawaya (Doherty *8*).

The nearest ally of this small Cuckoo appears to be *Cacomantis aeruginosus* Salvad. of Buru, Ceram, Goram and Amboina, a form which Count Salvadori, with two specimens from Buru before him, at first identified with it (Ann. Mus. Civ. Gen. 1876, VIII, 373), but afterwards separated (op. cit. 1878, XIII, 458) on the ground that *C. aeruginosus* differs in the rufous chestnut of the under parts being more intense, but less pure and mixed with grey, and extending more towards the chin (Orn. Pap. 1880, I. 336).

Capt. Shelley (1891) again unites the two forms; but, in holding them distinct, we accept Salvadori's more recent view (Orn. Pap., Agg. 1891, 218). It may be pointed out that the Celebes form seems to have a shorter wing and longer tail than *C. aeruginosus*:

C. virescens: wing ca. 114; tail ca. 135.

C. aeruginosus: wing ca. 120; tail ca. 114.

C. merulinus differs in having the upper plumage paler, the grey of the throat carried over on to the upper breast; remainder of body below rufous buff, not cinnamon-rufous, the inner webs of the tail-feathers regularly barred with white, most strongly so on the outer feathers (Shelley); in *C. virescens* the bars are reduced to some inconspicuous notches.

By the grey of the throat being spread on to the breast and by the inner webs of the tail-feathers being barred, or deeply notched, with white, *C. assimilis* Gray of the Moluccas (var. *major* Salvad.) and Papuasia may readily be distinguished.

We have seen a specimen from Mr. Nehrkorn's collection, Nr. 1758, Sooloo Islands (Platen), with a deep rufous throat, breast and under surface, wing 123, tail 150 (ca.) mm; "Iris braun, Schnabel schwarz, Basis, Augenring und Füsse gelblich". This appears to be a new species, unless it is *C. sepulchralis* which Shelley unites with *C. merulinus*. Dr. Sharpe (Ibis 1894, 247, 258) records from Sooloo *C. merulinus* only.

The first notice of the occurence of a *Cacomantis* in Celebes was made by Walden, in reference to three specimens obtained by Meyer in 1871, though in the British Museum there is a specimen of earlier date killed by Wallace at Manado. The cry of the bird, according to Meyer, is tü, tü, tütütü, like a flute. It has recently been sent from various parts of Celebes and from Banggai by other collectors. Feeds on insects.

The nest referred to by Meyer as that of this species must doubtless be that of some other bird, very possibly that of one into whose care its eggs are usually given. The parasitical habits of the genus *Cacomantis* have been established in the case of at least three species — *C. passerinus* (Vahl), *C. flabelliformis* (Lath.) and *C. pallidus* (Lath.) and, apparently, *C. merulinus* (Scop.), cf. Oates, Hume's Nests and Eggs Ind. B. II, 385; North, Nests and Eggs B. Austr. 1889, 243, 244; Baldamus, Leben europ. Kuckucke, 1892, 134—138.

66. CACOMANTIS MERULINUS (Scop.).

Buff-bellied Cuckoo.

a. **Cuculus merulinus** *(1)* Scop., Del. Flor. & Faun. Insubr. 1786, 89.

Cacomantis merulinus *(1)* Cab. & Hein., Mus. Hein. IV, I, 1863, 21; *(2)* Salvad., Cat. Ucc. Borneo 1874, 64; *(3)* Shelley, Cat. B. XIX, 1891, 268 pt.; *(4)* Büttik., Zool. Erg. Weber's Reise in Ost-Ind. 1893, III, 276; *(5)* Hose, Ibis 1893, 414; *(6)* Styan, ib. 433; *(7)* Sharpe, Ibis 1894, 247, 258; *(8)* Grant, ib. 520; *(9)* id., Ibis 1895, 262, 466; *(10)* Blanf., Faun. Br. Ind. B. III, 1895, 218; *(11)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 1, p. 8; *(12)* Grant, Ibis 1896, 474, 560; *(13)* Hartert, Nov. Zool. 1896, 551, 586; *(14)* Kuschel, Orn. Mb. 1895, 156; *(15)* Hartert, Nov. Zool. 1897, 164.

b. **Cacomantis lanceolatus** (S. Müll.), *(1)* Wald., Tr. Z. S. 1872, VIII, 53; *(2)* Meyer, Ibis 1879, 146.

Descriptions. Shelley *3*; Blanford *10*; etc.

Adult. Like the foregoing species, *C. virescens* (Brügg.), but paler above, the grey of the throat spreading over the breast; remaining under parts buff, not cinnamon-rufous; tail-feathers regularly barred with white on the inner webs, whereas in *C. virescens* the bars are reduced to inconspicuous notches (♂, Macassar, 10. July 95: P. & F. Sarasin).

"Iris orange-red; bill red-brown; feet yellow"; wing 104 mm; tail 105 (Platen in Mus. Nehrkorn — Nr. 1759 — Palawau).

Young. Above cinnamon, with broad stripes of dusky on head and neck, taking the form of bars on back and innermost remiges; on the other remiges and the tail-feathers the cinnamon develops into deep notches, extending as bars across the outer tail-feathers; under parts paler cinnamon, striped with dusky on throat and breast, taking the form of sagittate bars lower down and on under wing-coverts; remiges below notched on the inner webs (slightly so on the outer ones) with cinnamon, becoming uniform cinnamon-buff on the basal part of the feathers (♀, Macassar, 19. July 95: P. & F. Sarasin).

Immature (assuming adult dress). Head, neck, and throat chiefly clothed with the grey plumage of the adult, but with cinnamon feathers with dark centre-stripes of the young intermixed: wings and tail barred with cinnamon and dusky as in the young,

but two or three feathers of the adult in the tail; back, breast, and belly with young and adult plumage intermixed, the adult predominating above (♂, Macassar, 10. July 95: P. & F. Sarasin).

Measurements (2 ad., 2 juv. Celebes). Wing 102—106 mm; tail 103—113; tarsus c. 17; bill from nostril c. 12.5.

Egg. Cf. Kuschel *14*: Java.

Distribution. The Indian countries, to Malacca, Java, Bali, and Sumba, S. China and Hainan, south throughout the Philippines to Borneo, and Celebes (see Salvadori *2*, Shelley *3*, Blanford *10*, Styan *6*, Grant 12, Hartert *13*).

In Celebes — Macassar (Wallace *3*, Weber *4*, P. & F. Sarasin *11*); ? Togian (Meyer *b 2*); W. Celebes, Tawaya (Doherty *15*).

Among the two hundred and more specimens in the British Museum included by Capt. Shelley under the name *C. merulinus*, there is one marked: "♂ ad. Macassar (A. R. Wallace)". This appears to be the specimen which was in the hands of Lord Walden in 1872 *(b 1)*, when he remarked that it appeared to belong to the group of which *C. merulinus* is typical. This determination has recently been confirmed by Mr. Büttikofer, who records two specimens obtained by Prof. Weber at Macassar, and is further proven by four specimens obtained by Drs. P. and F. Sarasin at the same spot. Still further east Shelley records a specimen from Ternate, but this indication is not accepted without query by Count Salvadori (Orn. Pap., Agg. III, 1891, 218).

Shelley remarks that *C. merulinus* appears to consist of three races: viz. "*C. merulinus* (Scop.), a pale bird with the grey of the head and throat sharply defined and with clear regular white bars across the inner webs of the tail-feathers. *C. threnodes* Cab., a rather darker bird with a deeper rufous buff colour on the breast. *C. sepulchralis* (S. Müll.), with the upper parts nearly uniform, the notches on the outer webs of the tail-feathers shaded with rufous and the white bars on their inner webs nearly obsolete". From the last-named form, writes Mr. Büttikofer *(4)*, *C. merulinus* "should certainly be separated. It is distinguishable from *C. sepulchralis* by its smaller size (wing maximum 103, tail maximum 108 mm), further by the very pale ash-grey colour of head, nape, sides of neck, chin, throat and upper chest, which colour extends on to the upper breast in certain individuals, and by the very pale ochre-yellow colour of breast, abdomen and under tail-coverts".

Mr. Hartert is of opinion that *C. threnodes* may also have to be separated again from *C. merulinus*.

GENUS COCCYSTES Glog.

In this genus, the species of which are about the size of a Turtle-dove, the tail is much longer than the wing, and the occipital feathers are lengthened so as to form a crest. Bill moderate, nostril a slightly projecting, oval formation of skin; wing short, secondaries about $^3/_4$ its length, tail strongly

graduated, the outermost feathers rather more than $^1/_2$ its length, the upper tail-coverts very long, nearly $^1/_2$ the length of the tail. Shelley recognises 6 species and 2 subspecies, inhabiting Southern Europe, Africa and tropical Asia as far as Celebes and the Philippines. At least two of the species are known to be parasitic in their breeding-habits. As Mr. Blanford remarks: "It is possible that *Coccystes* may prove, when the anatomy and pterylosis are examined, to belong to the *Phoenicophainae*".

+ 67. COCCYSTES COROMANDUS (L.).

Red-winged Crested Cuckoo.

a. **Le Coucou hupé de Coromandel** *(1)* Briss., Orn. 1760, IV, 147, pl. XIa, f. 1.
b. **Cuculus coromandus** *(1)* Linn., S. N. 1766, I, 171.
c. **Le Coucou à collier blanc** *(1)* Levaill., Ois. d'Afr. 1806, V, 213.
d. **Oxylophus coromandus** *(1)* Jerd., Madr. Jrn. 1840, XI, 272.
Coccystes coromandus *(1)* Horsf. & Moore, Cat. B. Mus. E. I. Co. 1854, 693; *(2)* Bulger, Ibis 1869, 159; *(3)* Swinh., P. Z. S. 1871, 394; *(4)* Salvad., Cat. Ucc. Borneo 1874, 67; *(5)* Hume, Str. F. 1875, III, 82; *(6)* Brügg., Abh. Ver. Bremen 1876, V, 465, 531; *(7)* David & Oust., Ois. Chine 1877, 61; *(8)* Hume & Davison, Str. F. 1878, VI, 162; *(9)* Tweedd., P. Z. S. 1878, 946; *(10)* Scully, Str. F. 1879, VIII, 257; *(11)* Legge, B. Ceylon 1880, 249; *(11bis)* Vidal, Str. F. 1880, IX, 55; Butler, t. c. 389; *(12)* Müller, J. f. O. 1882, 406; *(13)* W. Blas., J. f. O. 1883, 122, 155; *(14)* Oates, B. Brit. Burmah 1883, II, 117; *(14bis)* Davison, Str. F. X, 1883, 360; *(15)* Büttik., Notes Leyd. Mus. 1886, IX, 29; *(16)* Norman, Ibis 1888, 400; *(17)* Hartert, J. f. O. 1889, 370; *(18)* Everett, J. Str. Br. R. A. S. 1889, 173; *(19)* Sharpe, Ibis 1890, 12, 282; *(19bis)* Hagen, T. Ned. Aard. Genoots. 1890 (2) VII, 137; *(20)* Shelley, Cat. B. XIX, 1891, 214; *(21)* Oates, Hume's Nests and Eggs Ind. B. 1891, II, 391; *(22)* Styan, Ibis 1891, 317, 325, 484; *(23)* Vorderman, Nat. Tdschr. Ned. Ind. 1892, LI, 380; *(24)* Hose, Ibis 1893, 415; *(25)* Bourns & Worces., B. Menage Exped. 1894, 35; *(26)* Blanf., Faun. Br. Ind. B. 1895, III, 227.
f. **Coccystes coromandus** var. **fuliginiventer** *(1)* Swinh., Ibis 1867, 227.
For further synonymy and references see Shelley *20*.
Figures and descriptions. Brisson *a I*; Levaill. *c I*; David & Oust. *7*; Scully *10*; Legge *11*; Oates *14*; Shelley *20*; Vorderman *23*; Blanford *26*.
Adult. Head above, including nape and ear-coverts, brownish black, a long crest blue-black; on hind neck a white collar; mantle greenish black, passing into glossy bottle-green on the scapulars, inner quills and lesser wing-coverts; the other wing-coverts and quills light hazel, the latter dull brownish at the ends; rump and upper tail-coverts black glossed with blue and green; tail blue-black, the extreme tips of the feathers, chiefly on the outer webs, white; chin, throat and sides of neck, upper breast, and under wing-coverts cinnamon washed with rufous (chestnut-buff or yellowish ferruginous); lower breast and sides white, slightly washed with the colour of the throat; thighs, flanks and abdomen brownish grey, becoming brownish black glossed with blue and tipped with light brown on the under tail-coverts; wing below cinnamon (Borneo, Nr. 7118).

"Iris brown; bill black, at the base somewhat bluish white; orbits grey-blue, feet lead-blue" (Hart. *17*).

Sexes. The male and female closely resemble one another.

Young. The nestling differs from the adult in having most of the feathers of the upper parts tipped with rufous, the collar being shaded with rufous; the tail-feathers broadly tipped with pale sandy buff; the throat buffy white like the chest, and the under tail-coverts rufous buff (Shelley *20*).

Measurements. Wing 155 (♀)—173 mm (♂); tail 229—254; tarsus 25.4; culmen 28—30 (Shelley *20*).

Egg. Very broad oval; fine and glossy. Moderately pale, blue, somewhat greenish, without any spots or specks. 26.6 × 23.2 mm (Oates *21*). Apparently parasitic in breeding habits.

Distribution. India, west to Kumaon, south to Trichinopoly (Norman *16*); Ceylon (Legge *11*); Pegu (Oates *14*); Tenasserim (Feilden *5*); China (Swinh. *f1*, *3*, David *7*, Styan *22*); Siam (fide Shelley *20*); Cambodia (Mouhot *20*); Salanga (A. Müll. *12*); Malacca (Davison *8*, *20*, Hartert *17*); Penang (Horsf. & Moore *1*); Singapore (Charlton *16*); Sumatra (S. Müll. *4*, Klaesi *15*, Hartert *17*); Bangka (van den Bossche *4*, Büttik. *15*); Java (Horsf., Kuhl, v. Hasselt *4*, Vorderman *23*); Borneo — North, West, South, Central, and North-west (Wallace, Everett, etc. *4*, *16*, *18*, *19*, *20*); Philippines — Mindanao (Everett *9*, *20*), Siquijor and Palawan (Bourns & Worcester *25*); Celebes — Minahassa (Fischer *6*, *13*).

A single example of this Cuckoo was shot on 18th October 1873 by Fischer at a height of 4000 ft. on Mount Lokon not far from Manado in the Minahassa. Only one specimen, as far as we can ascertain, was known from the Philippines prior to 1894, the bird having been shot by Mr. Everett at Zamboanga in Mindanao in March 1878, but Messrs. Bourns & Worcester afterwards obtained the species in Siquijor and Palawan. Everett considers it rare in Borneo, where, up to 1890, he had only met with two specimens; so, too, Dr. Vorderman remarks that it is scarce in Java *(23)*.

There is reason to believe that *Coccystes coromandus* is only a winter visitor to the East India Islands. Mr. Styan *(22)* marks it as a summer visitor to the Lower Yangtse division of China; Capt. Feilden *(5)* speaks of it as "the commonest Cuckoo at Thayetmyo, Tenasserim, ... arriving in the beginning of the rains (April) and the young birds do not leave till October"; in Tipperah and Sikkim further north, as well as in Tenasserim, Mr. Oates *(21)* records two cases of a female ready to lay being shot, but both in Sikkim and Lower Pegu it has been found in December as well *(20)*. Jerdon *(11)* says it is found in Bengal "only during the rains" (the months of our summer). In Ceylon, on the other hand, it is, according to Colonel Legge, a winter visitor, "arriving about October and departing again in April"; also in South India, where it has very rarely been obtained, it may prove to be only a winter visitor. Thus Mr. Vidal's specimen from the South Konkan was killed 2nd Jannary, 1880 *(11bis)*, and one from Kotagherry, Nilghiris (Miss Cockburn) in the British Museum is dated Dec. 5th *(20)*. The following are all the dates we find recorded from the south-eastern parts of its range:

Malacca: July *(20)*.
Salanga; Jan. 5th, 15th, March 7th *(12)*.

Sumatra: 2, sometime between Oct.—Mch. *(15)*.
Java: February *(23)*.
Borneo: Dec. 20th *(4)*, Dec. 29th *(19)*.
Celebes: October 18th *(6)*.
Mindanao: March *(9)*.

Many more observations are, of course, wanted before a decided opinion can be formed that the birds which visit China and Tenasserim in summer are the same individuals as those found in the East Indies in winter. In all probability such is the case. Mr. Hose *(24)* remarks that it "occurs on migration" on the Sarawak coast of Borneo, and, as regards Celebes, we are inclined to regard the species as a rare winter migrant, perhaps only a straggler.

C. coromandus is most likely entirely parasitic in its breeding habits. Thus, Capt. Feilden has shot a young one out of a brood of young Quaker Thrushes *(Alcippe)* and has found an egg, apparently of this Cuckoo, in the nest of that bird. Its food consists of hairy caterpillars, "beetles, grasshoppers, *Mantidae*, and other large insects" (Legge *11*, Hartert *17*).

The nearest ally of this Cuckoo is the *Coccystes glandarius* (L.) of "Southern and Central Europe, as far east as Persia, wintering in Africa" (Shelley), from which *C. coromandus* may be readily distinguished by the white collar across its hind neck and by the absence of large terminal spots of whitish on the wing-coverts. It is of some interest to note that these spots are to be seen to some extent in the immature *C. coromandus*.

GENUS SURNICULUS Less.

A genus of three small Cuckoos of about the size of a Lark, easily recognised by their general plumage of black and resemblance to a Drongo *(Dicrurus)*. The tail is about as long or longer than the wing, in two species forked, the outer feathers taking a lateral curl as in adult Drongos; in *S. velutinus* it is square; the outermost rectrix is short, about $^2/_3$ the length of the tail. Across the base of the wing below is a white band. The genus is found from the Himalayas to the Philippines, Batchian and Java. Davison (Str. F. 1878, VI, 159) observed a young one of *S. lugubris* in Tenasserim being fed by a Drongo; it is supposed, as Blanford says, to deposit its eggs in the nests of these birds.

+ 68. SURNICULUS MUSSCHENBROEKI A. B. M.

Van Musschenbroek's Drongo-cuckoo.

Surniculus musschenbroeki *(1)* Meyer, Rowl. Orn. Misc. 1878, III, 164; *(2)* Salvad., Ann. Mus. Civ. Gen. 1878, XIII, 461; *(3)* id., Orn. Pap. I, 1880, 357; *(4)* Shelley, Cat. B. XIX, 1891, 230; *(5)* Hartert, Nov. Zool. 1896, 159, 165.

Description. Meyer *1.*

Adult. Black, glossed with blue, on the wings with green; under wing-coverts and quills

below shining dusky, a narrow band of white across the basal third of the secondaries (except the inner ones) and of the primaries (except the three or four outer ones), a deep, narrow notch of white on inner web of first primary at half length; tail Drongo-like, the outermost feather short, about $\frac{3}{5}$ the length of the tail, with about 4 white spots near the shaft, the two terminal ones extending into obscure bars; tibio-tarsal feathers behind white and woolly; one or two of the longest under tail-feathers just tipped with white: bill black; feet (in skin) brown. Wing 136 mm; tail c. 145; tarsus c. 16; bill from nostril 15.5 (type, [♀] ad. Batchian: Meyer — Nr. 1972.

Distribution. Batchian (Meyer *1*); South Celebes — Indrulaman (Everett *5*); North Celebes (Hose, in the British Museum).

The type of this species, which was obtained by one of Meyer's hunters in Batchian, remained the only specimen known for more than twenty years, when the species was rediscovered by Everett on the foot-hills of the Peak of Bonthain, and two males in perfect plumage were sent to the Tring Museum. They differ in no important points from the type.

Capt. Shelley recognises three species of the genus *Surniculus*, viz. *S. lugubris* (Horsf.) ranging from India and Ceylon to Borneo and Java, *S. velutinus* Sharpe known from half a dozen islands of the Philippine group (see Grant, Ibis 1896, 559), and *S. musschenbroeki* from Batchian and, as we now see, N. & S. Celebes. The last is nearly related to *S. lugubris*, which differs by having the under parts glossy black-brown, instead of glossy blue-black, the under tail-coverts are transversely marked with white and the white bars on the outermost tail-feather are well marked. *S. velutinus* has the tail square.

When writing the history of the Cuckoos of Celebes for this work (about three years ago) we remarked with surprise upon *Surniculus* and *Chrysococcyx* as not having yet been found there, but the labours of Mr. Everett and of the Drs. Sarasin have now brought the discovery of both in the south of the island, the latter genus in two species.

A specimen from Mr. Hose, marked "♂, October 1895: Bantik, Celebes", and sent by Dr. Sharpe to the Dresden Museum for comparison with the type, has a much larger white patch on the middle of the occiput and the white bars on the outermost tail-feather less obliterated than in the type. Everett's 2 specimens from S. Celebes differ in much the same way, but it is hardly probable that these are racial characters. The wing of Hose's specimen measures 127 mm.

GENUS EUDYNAMIS Vig. Horsf.

In the Koels, which are about the size of a Turtle-dove, the bill is strong and almost perpendicularly decurved at the tip; the feet are large, the middle toe without the claw being as long as the tarsus: the wing is moderately

long, the tail as long as the wing, rounded, the outermost feathers about $^3/_4$ the length of the longest. The sexes are dissimilar in coloration, the male black, the female spotted or barred with tawny-brown and black. Six species are recognised in the Catalogue of Birds, they range from the Himalayas to Australia.

These Cuckoos are probably all parasitical; the Indian species deposits its eggs in Crows' nests, and in Borneo Whitehead found that the nest of a Mynah was used for this purpose.

4 * 69. EUDYNAMIS MELANORHYNCHA S. Müll.

Black-billed Koel.

Eudynamis melanorhyncha *(1)* S. Müll., Verh. Natuurk. Comm. 1839—44, 176; *(2)* Gray, Gen. B. 1847, II, 464; *(3)* Bp., Consp. Av. 1850, 101; *(4)* Cab. & Heine, Mus. Hein. 1862, IV, 55; *(5)* Finsch, New Guinea 1865, 159 (Celebes tantum); *(6)* Blyth, Ibis 1866, 364; *(7)* Wald., Ibis 1869, 344; *(8)* Gray, HL. 1870, II, 221; *(9)* Wald., Tr. Z. S. 1872, VIII, 53, 112; *(10)* Salvad., Ann. Mus. Civ. Gen. 1875, 650; *(11)* Brügg., Abh. Ver. Bremen 1876, V, 59, 406; *(12)* Lenz, J. f. O. 1877, 371; *(13)* Meyer, Ibis 1879, 69, 146; *(14)* id., Isis 1884, 18; *(15)* Guillem., P. Z. S. 1885, 550; *(16)* W. Blas., Ztschr. ges. Orn. 1886, 96; *(17)* id., Ornis 1888, 566; *(18)* Tristr., Cat. Coll. B. 1889, 82; *(19)* Heine & Rchw., Nomencl. Mus. Hein. 1890, 200; *(20)* Shelley, Cat. B. XIX, 1891, 327; *(21)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 6; *(22)* iid., ib. 1896, Nr. 2, p. 8; *(23)* Hartert. Nov. Zool. 1897, 164; *(XXIV)* Meyer, Abb. v. Vogelskel. 1897, pl. CCXXVIII.

a. **? Eudynamis fascialis** *(1)* Wall., P. Z. S. 1862, 339; *(2)* Blyth, Ibis 1866, 364; *(3)* Wald., Ibis 1869, 345; *(4)* Gray, HL. 1869, II, 221.

b. **Cuculus melanorhynchus** *(1)* Schl., Mus. P.-B. Cuculi 1864, 20.

"Kao", Minahassa, Malays (M. *13*).

"Kororeke" or **"Kembaluwan"**, Minahassa, inland names (M. *13*).

"Kuku buri"; hepatic phase, and

"Konil", mature plumage (Guillem. *15*).

"Koukou werreng", inland near Manado, or

"Kouo itam", Nat. Coll. Mus. Dresd.

"Kuow maitem", Tonkean, E. Celebes, iid.

"Totaal mapok", Peling, iid.

Descriptions. S. Müller *1*; Cabanis & Heine *4*; Walden *7*, *9*; Salvadori *10*; Brüggemann *11*; Guillemard *15*; Blasius *16*; Shelley *20*.

A.[1]) **Adult male.** All over glossy blue-black. Bill black; feet black; iris bright red *(15)*, (N. Celebes, C 3583, and others).

B. **Male nearly adult.** Above like the adult, but with some old dull feathers of blackish brown in tail, together with new ones of blue-black; under surface from chest downwards very dark olive with slight greenish reflexions (N. Celebes C 3584).

C. **Younger male.** Above like the adult, but all the quills dusky, except the innermost ones, which are blue-black; under surface from chest downwards wood-brown (or pale

1) The letters *A*, *a*, etc. are used to indicate individuals of opposite sexes of corresponding age, *A* being the fully adult male, *a* the fully adult female. *B* and *b* the next stage of the two sexes, and so on.

cinnamon), closely mottled with sooty, the flanks and under tail-coverts almost entirely of this colour (near Manado, C 10872).

D. **Male with earliest appearances of adult plumage.** Head, hind neck, and some sprouting feathers in the tail blue-black; rest of upper surface very dark glossy green, the quills with blue reflections; a pale stripe from rictus to side of neck; chin and throat blackish, passing into brownish green on chest; rest of under surface sooty brown, varied with cinnamon, especially on the breast and upper abdomen (Manado, C 1844).

Three other [♂] specimens, apparently slightly less developed, have the tail, like the back, very dark green, with greenish or bluish reflections; the cinnamon colour greatly predominating on the under surface and the long rictal stripe of white varied with cinnamon or brown broader and more distinct.

E and *e.* **First plumage** [♂ and ♀]. Above dark glossy green, uniform, approaching to black on the head; chin and throat dusky; rictal streak of fulvous white passing into the cinnamon-brown of sides of neck; under surface cinnamon, each feather crossed with two or three fine brace-shaped bars of dusky (C 5181 and three others). In one the bars on the under surface are quite absent (C 1843). Tail-feathers of the two others obscurely barred with dark cinnamon (C 263, C 1845). Bill in C 5181 dark horn-brown, under mandible paler; in C 263 and 1845 darker horn; in 1843 black.

Nestling. Plumage uniform above, apparently similar to the above, and below similarly cinnamon with brace-shaped bars (Tomohon, 15. IV. 94: P. & F. Sarasin).

c. **Female with earliest appearances of adult plumage.** Head, neck and mantle bluish black, as in male with earliest appearance of adult dress (see *supra*); back and wing-coverts varied with somewhat obscure bars of rufous brown (cinnamon-hazel); wings composed of old dusky feathers, uniform as in the young, and of new ones (some of them sprouting) crossed with cinnamon-hazel and black bars, the black ones a little the broadest; tail similarly composed of new feathers — some of them growing — barred with cinnamon-hazel and black, one old feather is dusky with the cinnamon markings very obscure; chin and throat black, slightly touched up with whitish brown; rictal streak white; under surface fulvous cinnamon, crossed with narrow brace-shaped blackish bars. Bill blackish horn-colour (near Manado, C 10869).

From the circumstance that the third and fourth quills of one wing and the third and fifth of the other are old feathers, but are nevertheless considerably marked with imperfectly-formed bars of cinnamon in their basal two-thirds, we infer that this specimen may be a second-year bird passing into its third phase of dress. The quills, in what we take to be young specimens in first plumage, are uniform, but perhaps our four young ones are all males. Another [♀] specimen (C 266), apparently of the same age as the above is somewhat more melanistic in character.

b. **Female a little older.** Like the last, but with no remains of a younger dress. Head, neck and mantle bluish black; rest of upper surface evenly barred with cinnamon-hazel and black; chin and throat black; below fulvous cinnamon, finely barred with dusky (near Manado, C 10871).

a. **Adult female.** Like the last, but with the head, neck, chin and throat cinnamon-hazel with dusky edges to most of the feathers, giving a somewhat streaked appearance; the cinnamon-hazel bars of the upper surface much broader than the black ones (♀, Kema, 7. Aug. 93: P. & F. S.). In C 3581 the bill is dark horn-colour, the under mandible paler; in C 10870 almost all black.

Three other specimens afford transitions between the immature stage *b* and the adult stage *a* (N. Celebes, C 265, 5183, 264).

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (C 1848) ad. [♂] Manado, March 1871	210	210	30	18.5
b. (C 3581) ad. [♀] N. Celebes, 1877	186	192	32	18.5

Distribution. Celebes — Minahassa (Forsten *b 1*, Meyer *9*, Fischer *11 etc.*); Gorontalo (Forsten *b 1*, Meyer *13*); Talissi Island (Guillem. *15*); Banka, Lembeh and Mantehage Islands (Nat. Coll.); Togian Islands (Meyer *13*); Macassar (Wallace *20*); West Celebes (Doherty *23*); E. Celebes, and Peling (Nat. Coll.); Sula Islands (Allen *a 1, 20*).

Brüggemann *(11)* records a specimen as having come from Sangi, but this would appear to be a mistake, since that island has a race of *Eudynamis* of its own, *E. mindanensis sangirensis* W. Blas.

In the foregoing sketch of the several stages of dress passed through by this Cuckoo a conclusion has been arrived at identical with that of Capt. Shelley, but differing radically from those of Lord Walden, Brüggemann, Dr. Guillemard, and Prof. W. Blasius. According to Shelley the adult male "is all over blue-black, the adult female above chestnut evenly barred with olive-black, . . . under parts (except chin and upper throat) buff, with numerous narrow wavy black bars"; Brüggemann, on the other hand, states that the sexes are alike both in size and colour, and what Shelley describes as the adult female is held by him, Walden, Blasius and Guillemard to be the first stage of immature dress. That these authorities are in error is shown by the nestling obtained by the Drs. Sarasin, as also, by the specimen described by us as *c* [♀] with earliest appearances of adult plumage, to which attention may be drawn. Here the new and growing feathers are barred with black and rufous brown, while the old worn feathers, which were about to be cast off, are of that more uniform brown appearance belonging to the fledgeling, but supposed by these authors to belong to a more advanced stage. As a great series before us in almost every phase of dress show, the young of both sexes are at first apparently just alike in coloration, but commence to deviate in the second stage, becoming more and more different as they approach maturity. Dissimilarity of the sexes is one of the characteristics of the genus *Eudynamis*, elsewhere, as Indian ornithologists well know.

There is a remarkably close resemblance between the old female of this Celebesian Cuckoo and the young of the wide-spread *Centrococcyx bengalensis* also a species occurring in Celebes. The young dress of *E. melanorhyncha* recalls the uniform coloration of the upper surface of *Coccystes coromandus*.

The only specimen as yet known from the Sula Islands is a male, apparently partially affected by albinism, which was obtained by Mr. Wallace's assistant, Allen, in Sula Besi or Sula Mangoli, and was named as distinct on account of its smaller size. This distinction is not found to hold good by Capt. Shelley, and until more specimens for comparison are forthcoming it should be regarded as identical with *E. melanorhyncha*. Shelley's opinion is confirmed by an example from Peling, resembling the birds of the mainland.

Meyer has described the Black-billed Koel *(13)* as "shy and lively in its actions. Roosts in the darkest spots in trees, where it can hardly be detected. If danger threatens, or if it hears a particular noise which frightens it, it communicates its alarm from afar to others; and it is no fable that the natives are warned by the bird hours before — if, for instance, a troop of horsemen approaches, or an official with his attendants. The native therefore often makes his preparations according to this bird's behaviour; hearing it in the forest he will always be cautious. But its cry at night he consults as an oracle, and converses with the bird by imitating its cry and interpreting it. If he hears it at night near a house he augurs the death of a man".

"I found mostly nutmegs in its stomach. Before nutmegs were cultivated in the Minahassa, which is only during the last few years [prior to 1871], the bird fed on different fruits, chiefly waringuis, but now nearly altogether on nutmegs, which it swallows whole for the sake of the rind; the nutmeg itself is found uninjured in the crop or stomach; and the bird contributes greatly to the distribution of this spice. It damages the plantations very much. It is said to seek its food at night".

Meyer learnt that it lays its eggs in other birds' nests, but could not ascertain in which, and the cousins Sarasin have recently produced proof of its parasitic habits through the young one described above, which was "brought in a nest which the boy ascribed (in our opinion, however, incorrectly) to *Enodes erythrophrys*". Many interesting facts on the breeding of *Eudynamis honorata* (L.) in India are recorded in Hume's "Nests and Eggs of Indian Birds" (Oates, ed. 1891, II, 392—397); this species always deposits its eggs in Crows' nests, usually that of *Corvus splendens*. So, too, in Burmah *E. malayana* Cab. & Heine lays its eggs, says Mr. Oates, in the nests of Crows; and Dr. Tiraud states that in Cochin China the eggs are also placed in the nests of Mynahs (B. Brit. Burmah II, 120). *E. mindanensis* also makes use of a Mynah's nest (Whitehead, Ibis 1888, 410). It will therefore very probably be found that in Celebes *Corvus enca* is one, perhaps the most usual, foster-parent of *E. melanorhyncha*.

In India the Cuckoo sometimes pays dearly for her imposition; *Corvus culminatus*, writes Mr. Anderson, "is easely duped, while her cunning congener, *C. splendens*, is fully aware of the deception". Colonel Butler records a case of a female specimen being mobbed to death by crows, and of a male (which, as Mr. Anderson says, frequently accompanies the female when she is about to deposit her egg), being so harried by two Crows that he was able to take it by hand. Naturalists, who believe in protective mimicry, may wonder that the males of *Eudynamis* are black corvine-looking birds, while their females, to whom a deceptive resemblance to the Crows might be of value, differ greatly in coloration.

The young are black, as Mr. Whitehead states in the allied *E. mindanensis* (Ibis 1888, 410, Expl. Kini Balu 1893, 145), and Capt. Shelley in *E. honorata*, resembling the adult males instead of, as is much more usual among birds, the

female, or of being different from either. Mr. Whitehead to account for it makes the following plausible suggestion: "the 'Phow' *(E mindanensis)* lays its eggs in the nest of the Yellow-mottled Mynah *(Gracula javanensis)*. The young Cuckoo, being black, does not differ from the young Mynah, and so the deception is carried on until the young bird can take care of itself". Much has been written on the resemblance of the eggs of Cuckoos to those of the birds in whose nests they are placed, and with good reason; but mimicry, if it be so, of the young of its foster-mother by the young Cuckoo brings another phase of the question before us. It is very conceivable that this resemblance is of advantage to the young Cuckoo. The clever *Corvus splendens* of India apparently recognises the imposture and abandons the Cuckoo, as Mr. Hume has observed, when it leaves the nest; nevertheless the philoprogenitive instinct in birds is so irresistible that their discriminative powers often appear scarcely to come into play at all. Those which have hatched the young *Cuculus canorus*, do not think to restrain themselves from attending to his wants; "the actions of his foster-parents", writes Prof. Newton, "become, when he is full grown, almost ludicrous, for they often have to perch between his shoulders to place in his gaping mouth the delicate morsels he is too indolent or too stupid to take from their bill" (Dict. of B. 120). *Corvus splendens*, however, is fully aware that *Eudynamis* is in the habit of imposing her eggs upon her; the species in whose nests *C. canorus* places her eggs do not, perhaps, discover that they have been cheated, but rear the young Cuckoo as a surprisingly fine-grown offspring of their own. Were the Cuckoo the most insignificant of the brood in point of size, as well as being so anomalous in structure — this is the case with *Eudynamis* in the nest of *Corvus* — it would run more risk of neglect, and a special adaptation of plumage might be an advantage to it. The dwarf pig of a litter is, if we are not misinformed, often devoured by the mother.

The origin of the habit of laying their eggs in the nests of other birds probably dates very far back among the Cuckoos; there is reason to suppose that the habit runs through all the genera (except *Coccyzus*) of the subfamily, *Cuculinae*, as defined by Capt. Shelley (Cat. B. XIX, 210) embracing forms differing greatly in coloration and considerably in structure. Thus, Dr. Baldamus (Leben der europ. Kuckucke, 1892) cites cases of parasitism in the genera, *Cuculus*, *Hierococcyx* [1]), *Cacomantis*, *Heteroscenes* [2]), *Lamprococcyx (Chalcococcyx)*, *Eudynamis*, *Urodynamis* [3]), *Scythrops*, *Coccystes*. Prof. Newton, further, speaks of species of *Surniculus*, *Phoenicophaes* and *Zanclostoma* as parasitical (Dict. of Birds 1893, 125), but we venture to express a doubt in regard to the two last-named genera, which Shelley places in an other subfamily, *Phoenicophaeinae*, inasmuch as *Rhopodytes (Zanclostoma) tristis* and *viridirostris* are known to build their own nests (Hume, Oates ed. t. c. 397, 399).

[1]) *H. sparverioides* is apparently only partially parasitical.
[2]) Treated by Shelley as identical with *Cuculus*.
[3]) Perhaps only partially parasitical (cf. Finsch, Mitth. Orn. Ver. Wien 1884, VIII, 126).

The correspondence in habits between *Eudynamis* and *Cuculus* is further displayed by the circumstance that the young Crows, which have the misfortune to find themselves in the same nest with the *Eudynamis*, are sometimes ejected, "probably", as Mr. Hume says, "by the young Cuckoo; I have found the latter in a nest with three young Crows, all freshly hatched, and a week later have found the young Crows "missing" and the young Cuckoo thriving". Mr. Hume was of opinion that the Crows' eggs were not destroyed by the mother Cuckoo; Colonel Butler, on the other hand, says, "when the hen birds lays she often turns some of the Crow's eggs out of the nest, as I have several times examined Crows' nests and found three or four eggs one day, and on examining them a day or two later have found some of the Crows' eggs missing and Coëls' eggs in their place". There is some reason to suppose that the Common Cuckoo, *C. canorus*, sometimes turns out one or more of the foster-parent's eggs (Newton, Dict. 121).

Capt. Hutton's observations on the old *Cuculus intermedius* feeding a young one after leaving the nest have already been quoted from Hume's great work; so, too, as has already been indicated, in the case of the present genus Hume has a similar observation: "I have never seen Crows feeding fully fledged Coëls out of the nest, whereas I have repeatedly watched adult female Coëls feeding young ones of their own species" (Nests and Eggs 1891, II, 393). There is, according to Prof. Newton, no evidence worthy of consideration that the female of *C. canorus* takes any interest "in the future welfare of the egg she has foisted upon her victim, or of its product"; the observations of Mr. Hume and Capt. Hutton, nevertheless, render it certain that two Cuckoos at least, and we suspect all parasitic birds, are not totally devoid of sympathetic instincts for the wants of young members of their own species; though, whether the individuals observed looking after the young Cuckoos were their identical mothers or not, there it no evidence to show.

70. EUDYNAMIS MINDANENSIS (L.).

Philippine Koel.

While the preceding species, *E. melanorphyncha* of Celebes and Sula, is readily distinguishable by its black bill from other members of the genus *Eudynamis*, the distinguishing characters of the remaining species, which are spread out from India and S. China across the Archipelago to New Guinea and Australia, are by no means so strongly pronounced. Especial care, too, is called for in considering the western forms, owing to the circumstance that — in certain parts at least — the species are not perfectly stationary. Thus, the species spoken of as *Eudynamis maculata* by Swinhoe (P. Z. S. 1871, 394), David & Oustalet (Ois. Chine 60) and De La Touche (Ibis 1892, 480) is only a summer visitor to South China; and Mr. Whitehead remarks: "I never heard

or shot an adult bird [of *E. mindanensis* in Palawan] after the middle of August, when it no doubt migrates to Borneo and other islands, as most of the birds in Labuan are seen after September during the N.E. Monsoon" (Ibis 1888, 410).

In the Sangi Islands an *Eudynamis* occurs which Prof. W. Blasius has separated as a variety of *E. mindanensis*. It may be doubted whether *E. mindanensis* itself is entitled to more than subspecific separation (i. e. whether individuals of it do not intergrade with *E. honorata* or *E. orientalis*); for the present, however, it appears best, in view of the want of sufficient data and material, to treat it as a species, composed of the following two subspecies:

1. The typical Eudynamis mindanensis.

a. **Cuculus mindanensis** *(1)* Linn., S. N. 1766, I, 69 (ex Brisson).

b. **Eudynamis mindanensis** *(1)* Cab. & Heine, Mus. Hein. 1862, IV, 52; *(2)* Wald., Ibis 1869, 340, ? pt.; *(3)* id., Tr. L. S. 1875, IX, 162; *(4)* Sharpe, ib. 1877, 2nd ser. I, 320, 351; *(5)* Tweedd., P. Z. S. 1877, 543, 691, 823; 1878, 946; 1879, 70; *(6)* W. Blas., Ornis 1888, 306; Ibis 1888, 373; *(7)* Everett, J. Str. Br. R. A. S. 1889, 173; *(8)* Whitehead, Ibis 1890, 46; *(9)* W. Blas., J. f. O. 1890, 138; *(10)* Steere, List Coll. B. Philip. Is. 1890, 12; *(11)* Shelley, Cat. B. XIX, 1891, 321; *(12)* Hartert, J. f. O. 1891, 298; *(13)* Whitehd., Expl. Kini Balu 1893, 145; *(14)* Sharpe, Ibis 1894, 247, 258; *(15)* Bourns & Worces., B. Menage Exp. 1894, 35; *(16)* Grant, Ibis 1895, 115; 1896, 123, 474.

c. **Eudynamis malayana** Sharpe, Ibis 1888, 198 (fide Whitehead).

d. **Eudynamis orientalis** *(1)* Whitehead, Ibis 1888, 409.

Descriptions. Cabanis & Heine *b 1*; Tweeddale *b 5*; Shelley *b 11*.

Adult male. Entirely black, glossed with blue. "Iris bright crimson; bill greenish grey; feet darker greenish grey" (Everett *b 5*).

Adult female. Above dusky, glossed with olive, the head and sides of neck streaked with rufescent brown, the rest of the upper surface spangled (several spots on each feather), and the quills and tail rather narrowly barred, with the same colour or a rather paler shade; chin and throat pale tawny, the bases and margins of the feathers black; remaining under parts paler barred with dusky. The bars on the wings and tail do not quite reach to the shaft. "Iris bright crimson; bill and legs greenish plumbeous" (Everett *b 5*).

Young. "The young of both sexes are black, like the adult male. The only signs of the female plumage in one young female were on the secondaries, which, on the inside of the wing, were slightly barred with brown. Another young female had two or three brown feathers on the back, the wings being dull black" (Whitehead *d 1*).

Distribution. Philippine Islands — Luzon (Everett *b 5*), Mindoro, Mindanao, Basilan, Samar, Marinduque, Guimaras (Everett *b 5*, Steere *b 10*, Meyer *b 3*), Negros (Everett *b 11*), Palawan (Whitehead *d 1*, *b 8*, Platen *b 6*), Sooloo Islands (Platen *b 9*).

† 2. Eudynamis mindanensis sangirensis (W. Blas.).

e. **Eudynamis niger** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 57.

f. **Eudynamis nigra** *(1)* Fischer, op. cit. p. 538.

g. **Eudynamis sp. nov.** ? *(1)* Salvad., Atti Ac. Torino 1878, 1188.

h. **Eudynamis mindanensis** *(1)* Meyer, Isis 1884, 6, 17; *(2)* W. Blas., "Braunschweig. Anz."

11. Jan. 1888, Nr. 9, p. 86; id., Russ' Isis 1888, 78; *(3)* Shelley, Cat. B. XIX, 1891, 321 (Sangi).

k. **Eudynamis mindanensis** var. **sanghirensis** *(1)* W. Blas., Ornis 1888, 566—569.

l. **Eudynamis mindanensis sanghirensis** *(1)* M. & Wg., J. f. O. 1894, 241; *(2)* iid., Abh. Mus. Dresd. 1895, Nr. 9, p. 3.

"Buago" ♂, **"Liaga"** ♀ or **"Paparapa"**, Talaut, Nat. Coll. in Mus. Dresd.

"Kuwao maitung" [♂], **"Kuwao"** [♀] Tagulandang, iid.

Descriptions. Brüggemann *e 1*; Meyer *h 1*; W. Blasius *k 1.*

Adult male. Bill broader and stronger, the ridge of the culmen considerably more rounded; the plumage with greener reflexions than in the *typical E. mindanensis* (W. Blasius *k 1*).

Without Philippine specimens for comparison we quote Blasius' diagnosis.

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (C 1852) [♂ ad.] Siao	200	192	35	33
b. (C 1853) [♀ ad.] Siao	201	190	30	30.5
c. (C 1851) [♀] Gt. Sangi	199	185	33	34
d. (C 1856) [♀ juv.] Gt. Sangi	183	180	31.5	30.5

Further adults (4 ♂, 4 ♀ ?) measure: wing 189—202; tail 186—196; bill from nostril 18.5—20.5 mm. The birds were shot early in November (Kabruang) or at the end of October (Salibabu), and several are in moult.

We have since received many more specimens from Talaut and Tagulandang.

Observation. The specimen *d* from Sangi and two others from Talaut are in the same phase of plumage as that described as "*c* [♀]" in our article on the foregoing species; namely they were losing old worn feathers of uniform dusky brown or black in the wings and tail, while new feathers barred with black and light rufous brown were in a growing condition when the birds were killed.

Distribution. Sangi and Talaut Islands — Great Sangi (Fischer *f 1*, Meyer *h 1*, Platen *k 1*), Siao (Meyer *h 1*), Tagulandang and Ruang (Nat. Coll.); Kabruang, Salibabu and Karkellang (Nat. Coll. *l 1* in Dresd. and Tring Mus.).

The bill of this species would appear to get paler with age, that of *E. melanorhyncha* blacker.

This form has never been found in Celebes; Brüggemann's specimens — 3 of which were at first supposed by him to have come from Manado — were obtained, as Fischer afterwards pointed out, in Sangi (presumably Great Sangi).

Attention has been drawn to Mr. Whitehead's remarks (antea p. 209) upon the species in Palawan, where it lays its eggs in the nest of the Yellow-mottled Mynah *(Gracula javanensis)*, and where it is believed by him to migrate to Borneo and other islands during the N.E. monsoon.

SUBFAMILY CENTROPODINAE.

These Cuckoos, or Coucals, vary from medium to large size and are recognisable by the long, nearly straight, hind claw, resembling that of a Lark, and by the shafts of contour-feathers of the head, mantle and breast, which are spinous and thickened. The nostril is a linear slit covered by a sort of oper-

culum of skin; and there is a row of stiff bristles above the eye. The tarsus is naked, except quite at the tibial joint; tail graduated, longer than the wing. The birds seem to be adapted to a life on the ground in jungle and scrub; they are not parasitic in their breeding-habits.

GENUS CENTROCOCCYX Cab. Heine.

In these Coucals the toes are not longer than the tarsus and the hind (first) toe with the claw is longer than the middle toe and claw. The bill is shorter than the head and considerably hooked; the contour-feathers of the head, mantle and breast are dense and close, with thickened pitch-black spinous shafts; wing short and blunt, 4th to 6th quills longest, secondaries shorter by about $^1/_6$ the wing-length; tail strongly graduated, longer than the wing by $^1/_3$ or $^1/_4$, the outermost rectrix about half the length of the tail. The sexes are similar in coloration, but the right testis only of the male is present; it is smaller than the female and broods on the eggs, while only the female has been as yet observed to utter call-notes. The young are quite different from the parents, covered with spines as fledgelings, then assuming a barred plumage.

+ 71. CENTROCOCCYX BENGALENSIS (Gm.).

Lesser Coucal.

a. **Cuculus bengalensis** *(1)* Gm., S. N. 1788, I, 412 (Bengala).

b. **Cuculus javanensis** *(1)* Dumont, Dict. Sc. Nat. 1818, XI, 144.

c. **Centropus affinis** *(1)* Horsf., Tr. Z. S. 1822, XIII, 180 (Java); *(2)* Bernst., J. f. O. 1859, 185; *(3)* id., ib. 1860, 269; *(4)* id., N. T. N. I. XXI, 1860, 27—49, pl. I (anat); *(5)* Sclat., Ibis 1861, 48, note (Java, Malacca, India); *(6)* Tristr., Cat. Coll. B. 1889, 85 (Java, Sumatra).

d. **Centropus lepidus** *(1)* Horsf. l. c. (Java).

e. **Centropus bengalensis** *(1)* Steph., Gen. Zool. 1826, XIV, 213; *(2)* David & Oust., Ois. Chine 1877, 59 (Formosa, Hainan); *(3)* Oates, Str. F. 1877, V, 146 (Pegu); *(4)* Gammie, t. c. 385 (Sikkim); *(5)* Hume & Davis., Str. F. 1878, VI, 171 (Tenasserim); *(6)* Bingham, Str. F. 1880, IX, 169 (Tenasserim); *(7)* Styan, Ibis 1887, 230 (Foochow); *(8)* Shelley, Cat. B. 1891, XIX, 352; *(9)* De La Touche, Ibis 1892, 480 (S. China); *(10)* Styan, ib. 1893, 433 (Hainan); *(11)* De La Touche, Ibis 1895, 336; *(12)* Blanf., Faun. Br. Ind. B. III, 1895, 243.

f. **Centropus dimidiatus** *(1)* Blyth, J. A. S. 1843, XII, 945; *(2)* Swinh., Ibis 1860, 360 (Amoy, Hong-Kong).

g. **?Centropus rectunguis** *(1)* Srickl., P. Z. S. 1846, 104; *(2)* Schl., Mus. P.-B. Cuculi 1864, 67 pt. (India, Formosa and E. India Islands); *(3)* Shelley, Cat. B. XIX, 1891, 343 (Malacca, Sumatra, Borneo).

h. **Centropus medius** *(1)* Bp., Consp. I, 1850, 108 (Amboina, Java), (ex S. Müll. MS.); *(2)* Wall., P. Z. S. 1863, 23 (Buru, Ceram, Gilolo).

i. **Centropus lignator** *(1)* Swinh., Ibis 1861, 48 (Formosa).

j. **Centrococcyx lepidus** *(1)* Cab. & Heine, Mus. Hein. 1862, IV, 109 (Java); *(2)* Hartert, J. f. O. 1889, 372 (Sumatra); *(3)* Heine & Rchnw., Nomencl. Mus. Hein. 1890, 204 (Java, Borneo).

k. **Centrococcyx affinis** *(1)* Cab. & Heine, Mus. Hein. 1862, IV, 110 (Java); *(2)* Wald., Tr. Z. S. 1872, VIII, 56—60, 112 (Java, Celebes, Flores); *(3)* Meyer, Ibis 1879, 70 (Celebes); *(4)* W. Blas., J. f. O. 1883, 132 (Celebes); *(5)* Meyer, Isis 1884, 6, 18 (Siao, Sangi, N. Celebes, Halmahera, Ceram); *(6)* Guillem., P. Z. S. 1885, 504 (Sumbawa), 551 (N. Celebes, Limbe); *(7)* Sharpe, Ibis 1888, 198 (Palawan); *(8)* Whitehead, Ibis 1890, 47 (Palawan); *(9)* Heine & Rchw., Nomencl. Hein. 1890, 204 (Java).

l. **Centrococcyx bengalensis** *(1)* Cab. & Hein., Mus. Hein. 1862, IV, 111 (Nepal); *(2)* Wald., Tr. Z. S. 1872, VIII, 59 (India, Burmah); *(3)* Hume, Str. F. 1875, III, 84 (Upper Pegu), 324 (Tenasserim); *(4)* id., Str. F. V, 1877, 28 (Cachar); *(5)* Ball, S. F. VII, 1878, 208 (Ind. Penin.); *(6)* Cripps, t. c. 266 (E. Bengal); *(7)* Hume, S. F. VIII, 1879, 55 (Malacca — Singapore); *(8)* Kelham, Ibis 1881, 395 (Malacca, Singapore); *(9)* Oates, Str. F. X, 1882, 196 (Pegu); *(10)* A. Müll., J. f. O. 1882, 410 (Salanga); *(11)* Oates; B. Brit. Burmah, 1883, II, 127 (India, Burmah, Tenasserim, China, Siam, Cochin China); *(12)* Davison, Str. F. X, 1883, 361 (Wynaard); *(13)* Hume, ib. XI, 1888, 78 (Manipur); *(14)* Heine & Rchw., Nomencl. Hein. 1890, 204 (Nepal); *(15)* Oates, ed. Hume's Nests & Eggs 1891, II, 406 (India); *(16)* Munn, Ibis 1894, 56; *(17)* M. & Wg., J. f. O. 1894, 241; *(18)* iid., Abh. Mus. Dresden 1895, Nr. 8, p. 6; *(19)* iid., ib. Nr. 9, p. 3; *(20)* iid., ib. 1896, Nr. 1, p. 8; *(21)* iid., ib. Nr. 2, p. 11.

m. **Centrococcyx moluccensis** *(1)* Cab. & Heine (ex Bernst. MS.), Mus. Hein. 1862, IV, 113 ("Tinor", Tidore or Timor; Ternate); *(2)* Wald., Tr. Z. S. 1872, VIII, 57, 59 (Ternate).

n. **?Centrococcyx rectunguis** *(1)* Cab. & Heine, Mus. Hein. IV, 114; *(2)* Büttik., Notes Leyd. Mus. 1887, 32 (W. Sumatra); *(3)* Hagen, T. Ned. Aard. Genoots. 1890 (2), VII, 137.

o. **Centropus viridis** *(1)* Swinh. (nec Scop.), P. Z. S. 1863, 266 (S. China, Formosa); *(2)* id., Ibis 1870, 235 (Hainan); *(3)* Guillem., P. Z. S. 1885, 257 (Sula Is.), (fide W. Blas., p. 14).

p. **Centrococcyx javanensis** *(1)* Wald., Tr. Z. S. 1872, VIII, 58, 60 (Java, Malacca, Banjermassing, Celebes); *(2)* id., Ibis 1872, 367 (N. Borneo); *(3)* Salvad., Cat. Ucc. Borneo 1874, 76 (Borneo, etc.); *(4)* id., Ann. Mus. Civ. 1875, VII, 651 (Celebes); *(5)* Sharpe, Ibis 1876, 34 (Borneo); *(6)* Salvad., Ann. Mus. Civ. 1879, XIV, 188 (Sumatra); *(7)* Nicholson, Ibis 1881, 141 (Java); 1883, 241 (Sumatra); *(8)* W. Blas., Ztschr. ges. Orn. 1885, 263—270 (S. Celebes); *(9)* id., Ibis 1888, 374 (Palawan); *(10)* id., Ornis 1888, 306 (Palawan), 570 (Sangi); *(11)* Everett, P. Z. S. 1889, 226 (Palawan); *(12)* id., J. Str. Br. R. A. S. 1889, 175 (Borneo, Palawan); *(13)* Sharpe, Ibis 1890, 14 (Labuan), 282 (Himalayas — Celebes); *(14)* W. Blas., J. f. O. 1890, 140 (Sulu Is.); *(15)* Salvad., Ann. Mus. Civ. 1891, (2) XII, 46 (Sumatra); *(16)* Vorderman, N. T. Ned. Ind. 1891, 217 (S. Sumatra); 1892, 383 (Java); *(17)* Hose, Ibis 1893, 416 (Borneo); *(18)* Büttik., Zool. Erg. Weber's Reise Ost-Ind. 1893, III, 276.

q. **Centrococcyx medius** *(1)* Wald., Tr. Z. S. 1872, VIII, 57, 58 (Amboyna, Ceram); *(2)* Salvad., Orn. Pap. 1880, I, 375 (Moluccas), Agg. 1889, 52 and 1891, 220; *(3)* Pleske, Bull. Acad. Petersb. 1884, 117 (Ternate).

r. **Centropus bengalensis** var. **affinis** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 61 (N. Celebes).

s. **Centropus bengalensis** var. **javanensis** *(1)* Brügg. l. c. (N. Celebes).

t. **Centropus moluccensis** *(1)* Rchnw., J. f. O. 1877, 218 (Celebes); *(2)* W. Blas., ib. 1883, 122.

u. **Centropus celebensis** Beddard (nec Q. & G.), P. Z. S. 1885, 183, 184 pterylogr.

v. **Centropus javanensis** *(1)* Sharpe, P. Z. S. 1879, 328 (Borneo); *(2)* id., Ibis 1879, 246 (Borneo).

w. **Centropus javanicus** *(1)* Shelley, Cat. B. XIX, 1891, 354; *(2)* Sharpe, Ibis 1894, 247; *(3)* Grant, t. c. 520; *(4)* Bourns & Worces., B. Menage Exped. 1894, 35; *(5)* Vorderm., N. T. Ned. Ind. 1895, LIV, 329, 333; *(6)* Clarke, Ibis 1895, 476; *(7)*

Hartert, Nov. Zool. 1895, 475; *(8)* id., ib. 1896, 552, 562, 572, 575, 586, 595; *(9)* Grant, Ibis 1896, 474.

x. **Centropus bengalensis lepidus** *(1)* Hartert, Kat. Mus. Senckenb. 1891, 150 (Java); *(2)* id., Ornis 1891, 122.

"**Burong kussu-kussu**" (Bird of the high grass), Manado, Meyer *k 3*; Nat. Coll., Dresd. Mus.

"**Totombarang**", inland name, Minahassa, Meyer *k 3*.

"**Kuluket**", Guillem. *k 6* or "**Koloket**", Nat. Coll., Dresd. M., inland name near Manado.

"**Kalukku**", Maros, S. Celebes, Platen *p 8*.

"**Aroöa**" or "**Aeroöta**", Talaut, Nat. Coll.

"**Karoko**", Balante, E. Celebes, iid.

For further synonymy and references see Salvad. *p 3, q 2*; Cab. & Heine *j 1, k 1, l 1, m 1, n 1*; Shelley *e 8, w 1*.

Descriptions. Hume & Davison *e 5*; David & Oustalet *e 2*; A. Müller *l 10*; Oates *l 11*; Salvadori *q 2*; W. Blasius *p 8*; Shelley *e 8, w 1*; Blanford *e 12*.

Adult male. Head, neck, mantle and all the under parts black, glossed with greenish on the upper parts and chest, more sooty on the lower under parts; the shafts of all the feathers spinous and stiff, jet black; wings cinnamon-rufous, the ends of the primaries, the inner secondaries and scapulars brown with a slight gloss; back sooty; upper tail-coverts and tail black glossed with bronze-green; quills below purer rufous than above; under wing-coverts cinnamon-rufous, slightly varied with brown (N. Celebes, C 3579). "Iris dark brown; bill black; feet slate-grey" (Platen *p 8*).

Nearly adult male. Differs in having the gloss on head, neck and chest blue-black; mantle, like inner quills, deep reddish brown contrasting with the neck, shafts whitish; back and rump black, barred with wood-brown; upper tail-coverts glossed with bluish, tail with bronze-green, terminally fringed with rufous and an imperfect bar of the same on some of the lateral feathers (Maros, S. Celebes, 16. II. 1878, C 12081).

Adult female. Like the adult male, but much larger, the gloss on the head and neck possibly a shade bluer (S. Celebes, Feb., C 12082).

Nearly adult female. Like the nearly adult male, but not quite so far advanced in coloration: many of the feathers in the black plumage of head, neck, and underparts with some part of the shaft white (usually the tip, sometimes the middle); under parts black varied with pale fawn-colour alongside the white portion of the shaft (Nr. 7093).

Younger female. Head and hind-neck black as the last, but most of the feathers with part of the shafts and the adjacent part of feather fulvous white, forming a narrow streak; below pale cinnamon-tawny with pale shafts, barred with dusky on the sides and thighs, and varied with some black feathers barred with tawny; wings and tail still much as in adult; upper tail-coverts barred with tawny brown. (Near Manado, C 10873.) Bill blackish horn-colour, paler at the base.[1])

First plumage [male and female][2]). Head and neck tawny-cinnamon, the sides and bases of the feathers black, giving a streaked appearance; on mantle, back and wings the black

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[1]) This specimen does not uphold Prof. W. Blasius' view (*p 8*, p. 270) that the change of coloration in this species very likely takes place on the head and body — not wings and tail — without moulting, as it is obviously moulting, but the former specimen (Nr. 7093) with the same particoloured appearance below does not show any trace of moulting. We, however, take this simply for the ordinary second plumage. A nestling of *C. sinensis* in the possession of Mr. De La Touche, bought 26th August, 1886, assumed the adult plumage in the following summer; it began to show in patches in the early spring, but unfortunately Mr. De La Touche does not say whether the feathers were moulted or not (Ibis 1892, 480).

[2]) Mr. Oates makes the unexpected statement that the adults in winter plumage are clothed like young birds in first plumage *(l 9, l 11)*. We have specimens in the ordinary adult dress from Celebes, Talaut, Sangi, Tagulandang and Ceram dated January, February, March, April, May, June, July, August, October, November.

(here dusky) and tawny-cinnamon take the form of bars of about equal width; tail glossed with green and barred narrowly with tawny-cinnamon; below fawn-colour, almost clear of bars along the middle line of the under surface, more tawny and barred with dusky on the sides, flanks, under wing- and tail-coverts (Minahassa, Aug.—Sept., C 10874, ib. Aug.—Sept. 10795; Gt. Sangi C 1516). Bill light yellow horn-colour, blackish at base of upper mandible.

Nestling about a fortnight old. Like the last-described in all respects, except that the tawny-cinnamon bars on the tail-feathers, which are just making their appearance, are about as broad as the black ones. In the full-grown tail-feathers of the above specimens they are only about $^1/_4$ the width of the black bars (Ternate, C 788).

Two unfledged nestlings taken by the Drs. Sarasin in N. Celebes are covered with spines almost comparable to those of a Hedgehog, but from the tip of many of them issues a single, long, white hair or fibre, particularly on the nape and shoulders (Kema, 21. Aug. 1893: P. & F. Sarasin).

Eggs. "White, glossy, somewhat hard-shelled, fatty to the touch, in form elliptical: 32—33 × 23.5 mm" (Nehrkorn MS., 2, collected by Dr. Platen at Rurukan, Minahassa, 11. May 1886).

Nest. "Shaped like an egg, about 10 inches high and 8 inches in diameter. The entrance, 5 by 4, midway between top and bottom. Composed of elephant-grass and the surrounding grasses are bent down and incorporated in the structure. The egg-chamber and sides neatly lined with thatch-grass. The walls about 1 inch thick" (Oates *l 15*).

Number of eggs 2 or 3; Mr. Inglis in Cachar generally found 6.

See, also, Bernstein's admirable description: J. f. O. 1859, 185.

Measurements. The female is usually considerably larger than the male. Prof. W. Blasius *(p 8)* records the following:

Males: length in the flesh 345—370; expanse 410—455 mm,

Females: length in the flesh 390—430; expanse 505—520 (Platen).

Females	Wing	Tail	Tarsus
g. South Celebes (Platen)	174	212	41
i. South Celebes (Platen)	172	227	42
f. South Celebes (Platen)	180	239	43
h. South Celebes (Platen)	176	231	42
k.[1]) South Celebes (Platen)	183	235	42

Males	Wing	Tail	Tarsus
a. South Celebes (Platen)	154	209	39
b. South Celebes (Platen)	159	203	38
e. South Celebes (Platen)	156	201	38
c. South Celebes (Platen)	158	207	39
d. South Celebes (Platen)	157	191	38

Hume records the following measurements taken in the flesh *(e 5)*:

Adult males from various localities, from Johore to Suddhya (Assam): Length 323—330 mm; expanse 404—437; wing 133—140; tail 171—196; tarsus 37—39; bill from gape 28—48; hind toe claw inside 18—24.

[1]) The label of this was lost. The letters are those given by Prof. W. Blasius.

Adult females. Length 362—380 mm; expanse 463—476; wing 165—173; tail 213—218; tarsus 41—43; bill from gape 32; hind toe claw inside 23—28.

"And the bills are not only longer, but markedly stouter as a body than those of the males."

From the careful measurements of Hume, Blasius, and Salvadori *(q 2)*, who independently obtain similar results, it is obvious that Mr. Oates's statement, that "the female is of about the same size as the male" *(l 11)*, is not correct; so, too, the measurements of Capt. Shelley *(e 8, w 1)*, which suggest an equal size of the sexes, are misleading.

Variation. It is of interest to note that the males and females of South Celebes measured by Blasius and Platen are respectively much larger than the males and females of Malacca—India measured by Hume; while Salvadori's Moluccan specimens are still larger than those of Blasius.

Distribution. India — Himalayas from Nepal to Sikkim and Assam *(e 8, e 4, l 1)*; Central India (Ball *l 5*, etc., *e 8*); South India — Wynaard (Davison *l 12*); Travancore (Bourdillon *e 8*); Khasia Hills (Chennell *e 8*, Griffith *w 1*); Manipur (Hume *l 13*); Upper Pegu (Oates *l 3*); Burmah (Oates *l 11*); Tenasserim (Davison *e 5*, Bingham *e 6*); South China (Swinh. *o 1*, De La Touche *e 9*); Formosa and Hainan (Swinh. *o 1*, *o 2*, David *e 2*); Siam (fide Oates *l 11*, Tweedd. Coll. *e 8*); Cochin China (fide Oates *l 11*); Salanga (A. Müll. *l 10*); Malacca (Davison *e 8*, Hume *l 7*, Kelham *l 8*); Penang (Brit. Mus. *e 8*); Bunguran (Hose *w 7*); Singapore (Davison *e 8*, Hume *l 7*, Kelham *l 8*); Sumatra (Beccari *p 6*, H. O. Forbes *p 7*, ? Klaesi *n 2*, Modigl. *l 15*); Banka (v. d. Bossche *g 2*); Java (Horsf. *c 1*, *d 1*, H. O. Forbes *p 7*, Vorderman *p 16*, etc.); Bali (Doherty *w 8*); Lombok (Vorderman, Doherty *w 5*, *w 8*); Sumbawa (Forsten *g 2*, Guillem. *k 6*); Satonda and Sumba (Doherty *w 8*); Flores (Wall. *e 8*); Timor (Wall. *g 2*, *e 8*); Borneo (Schwaner *g 2*, Mottley Doria & Beccari *p 3*, etc.); Philippine Is. (B. & W. *w 4*, Whitehead *w 9*); Palawan (Whitehead *k 7*, *k 8*, Platen *p 10*); Sooloo Is. (Guillem. *o 3*, Platen *p 14*); Talaut Is. (Nat. Coll.); Great Sangi and Siao (Meyer *k 5*); Tagulandang (Nat. Coll.); Celebes — Lembeh Id. (Guillem. *k 6*); Banka and Menado tua (Nat. Coll., Dresd. M.); Minahassa (Meyer *k 2*, *k 3*, Beccari *p 4*, etc.); Gorontalo (Forsten *g 2*); Balante, E. Cel. (Nat. Coll.); Kandari, S. E. Penin. (Beccari *p 4*); Luwu (Weber *p 18*); Palopo (P. & F. Sarasin); Macassar (Wall. *e 8*, Weber *p 18*); Maros Waterfall (Platen *p 8*, Weber *p 18*); Amboina, Ceram, Buru, Halmahera, Ternate, Tidore, Batchian (Salvad. *q 2*).

The Coucal, or "Lark-heeled Cuckoo", now under consideration has been split up by various authorities — by Cabanis and Heine into 5, by Walden into 6, by Shelley into 2 species, but upon grounds which are very unsatisfactory. Cabanis and Heine laboured under the disadvantage of having insufficient material, each form being represented in only one or two specimens; but two of the species recognised, *C. lepidus* Horsf. and *C. affinis* Horsf., are, as W. Blasius has now satisfactorily proved *(p 8)*, the male and female of the same species. By Shelley two races, *C. bengalensis* and *C. javanicus*, hardly distinguishable at the best, are recorded as occurring together in the same months of the year in the hill-country of N.E. India, in Pegu, and in Formosa. Were the means of distinction employed by Shelley allowed, both could also be recorded from Celebes. What is worse, Shelley is divided in his own mind

on the subject of this troublesome species; to wit, Davison's Tenasserim specimens are included under *C. javanicus*, but Hume's remarks relating thereto are planted in the synonymy of *C. bengalensis*; in the sketch of the distribution of *C. bengalensis* the author draws a line at the Burmese countries, though including in the synonymy records by Hume and Davison, Bingham, and Kelham of its plentiful occurrence in Tenasserim, the Malay Peninsula and Singapore; Cabanis and Heine's two specimens of *C. lepidus* from Java are, moreover, included in the synomymy of both the species recognised by Shelley. Authors, on the whole, are generally agreed in uniting specimens from neighbouring localities with which they are acquainted; Schlegel alone has grouped them together as one species, a decision which Büttikofer *(n 2)* rightly declines to undo. Thus Hume *(e 5)* says: "It may be that the Javan bird is distinct, but certainly all those that we have seen from the Malayan Peninsula have been identical with those from various parts of India and Burma". Shelley crosses the bridge from the Malay Peninsula to Java, as Sclater had done thirty years earlier *(c 2)*, and the soundness of which had been again indicated by A. Müller in 1882 *(l 10)*.

In another direction Capt. Shelley agrees with Mr. Oates *(l 11)* and the Abbé David & Dr. Oustalet *(e 2)* as to the identity of the birds from South China, with others of India; though he terms the race *C. javanicus*, and the other authors *C. bengalensis*. In the East Indies birds of the different Great Sunda Islands are very rightly, as it appears to us, united by Shelley as one species with those of the Moluccas, the identity of which with *C. javanensis* had been already indicated by Salvadori *(q 2)* and Meyer *(k 5)*.

With a large series of 22 specimens from Celebes, and further specimens from Tagulandang, Great Sangi, Siao, Talaut, Ceram, Halmahera, Ternate, 4 labelled "Moluccas", 4 or 5 Java, and 1 Sumatra before us, we are able to lend support to this view.

It is certain that, as a species, *C. bengalensis* ranges from the Himalayas and South China throughout the intermediate countries to the Moluccas.

The question next suggests itself: does this species tend to develop any extreme forms of coloration or size in special points of the area over which it is spread, or is it to be regarded as "one harmonious whole"? Before a new species can arise, isolation of some description is necessary; in other words, a group must be prevented by some cause or liking from interbreeding with the rest of the species before its complete separation by colour or structure can take place. An intergrading local race or subspecies will, however, always be likely to come to a head, if we may use the expression, at special centres in the range of a species of uninterrupted distribution, especially if it be stationary. During migration, many birds undoubtedly get lost and do not always find their way back to the place of their birth; such, settling in other localities, may interbreed with the individuals of the species found there and act as a check on the differentiation of local races.

In some parts of its range — perhaps in all — *C. bengalensis* is not a strictly stationary species. Thus, in Cachar, Mr. Inglis says "this Coucal arrives about the beginning of June and departs at the close of the rains; breeds from June till September" *(l 4)*; in Upper Pegu Mr. Oates found it "during 9 months of the year rather an uncommon bird" *(l 3)*; in East Bengal Mr. Cripps "cannot recollect ever having noticed this species in the cold weather", but has observed it from the beginning of May *(l 6)*. Mr. Gammie remarks that it has increased largely of late in Sikkim. It is resident in South China, according to Swinhoe *(o 1)*; resident in Hong-Kong, a straggler to Amoy *(f 2)*; sedentary, according to David and Oustalet, in Hainan and Formosa *(e 2)*; "plentiful" as Kelham says *(l 8)* "at all seasons throughout Perak, Larut, Port Wellesly, Johore, and all the Settlements".

It is not, therefore, surprising that in the East Indies, as the measurements of Hume, W. Blasius and Salvadori tend to show, the species should differ slightly in size from those found from Malacca to India; but there appears to be sufficient stir going on within the species as a whole to prevent the development of any well marked local differences of coloration. In Malacca, Sumatra and Borneo a form, which we believe to be only an occasional variety of this species, has the under wing-coverts black, and is separated by Capt. Shelley as a distinct species, *C. rectunguis*.[1])

What is known about this species is not yet sufficient for deciding whether, and where, trinomials might be judiciously conferred, and this must be left to the future, when the form is better known.

Mr. Gammie gives an excellent description of its habits in Sikkim. "Among the grassy scrub, up to 3500 feet, it is now abundant, where, only a few years ago, it was rarely to be found. In the earlier part of the rainy season its odd, monotonous notes are to be heard in every direction. I am not sure that the male calls, but have shot the female — as I found by dissection — when calling. It has a call of a double series of notes: whoot, whoot, whoot, whoot; then often a pause of four or five seconds, kurook, kurook, kurook, kurook. The whoot is ventriloquistic, sounding as coming from a distance of six or eight yards from the bird. Before calling, it seats itself about five feet from the ground, then you see it draw its neck and body together, slightly puffing out its body-feathers, raising its back and depressing its tail, and for every whoot there is a violent throb of the body as if the bird was in great pain, at the same time the motion of the throat is scarcely perceptible and its bill is closed. Then, as if greatly relieved, it stretches itself out, the feathers fall smooth, and with open mouth and throbbing throat comes the kurook without the slightest attempt at ventriloquism. When searching for the caller one must take no notice

[1]) It can hardly be *Centropus rectunguis* Strickl., since that species has "a deep blue tint on the head, neck and breast", and no mention is made by Strickland of black under wing-coverts; but these, and a bright gloss of "green on the head, back and lower breast" are the chief means of distinguishing *C. rectunguis* Shelley.

of the whoot but wait for the kurook. It feeds almost entirely upon grasshoppers and frequents the open, scrubby tracts only. I have never once seen it in larger forest".

In South Celebes in the month of February Dr. Platen found it a quiet and rather shy bird, appearing and disappearing in a mysterious manner before the traveller, as he moved through a hot treeless grass-plain, where the growth is taller than a man. "It flies, on being disturbed or when danger threatens, quickly downwards, then horizontally for a distance, to raise itself as quickly again and cling to another grass-stem, where it looks out for its prey. This species, too, feeds, like our German Cuckoo, without damage to its health, on hairy caterpillars; for on every dissection the walls of the stomach were found covered with brown-black caterpillar hairs. The bird presents the peculiarity that the male is much smaller than the female" *(p 8)*.

Two remarkable discoveries in connection with this species were made and fully described by Bernstein *(c 2, c 3, c 4)*, namely, the male is always to be found hatching the eggs by day (what share, if any, the female took in the work he could not ascertain), and it possesses only the right testicle, the left one being entirely wanting. It should further be borne in mind that the male is the smaller, weaker bird, and that, as Mr. Gammie's observations tend to show, it apparently leaves the female to do the "singing".

The young of this species, and we believe of all *Centrococcyges*, in its first plumage is wonderfully like the adult female of *Eudynamis melanorhyncha*, though it may, of course, be at once distinguished by its nostrils, which are feathered above, by its long Lark-like hind claw, and by the peculiar spinous character of the feathers of its head, neck and body.

This similarity is not kept up between the adults of *C. bengalensis* and the adult male of *E. melanorhyncha*, though both may be said to have developed in a melanistic direction[1]), the latter being entirely black, and *C. bengalensis* and its relations black with rufous wings and back. What is unusual about the case is that the young *Centrococcyx* resembles the adult female of *Eudynamis melanorhyncha* and not the young of that species, which is black, but Mr. Whitehead gives reasons (*antea* p. 209), why the plumage of the young *Eudynamis (E. mindanensis)* may have been specially modified to make it resemble the black young ones of its foster-parents. *Centrococcyx*, not being a parasitical Cuckoo, has no need of such an alteration in its young. This type of plumage is shared by the young of some other *Cuculinae*, such as *Cuculus*, *Cacomantis*, *Hierococcyx*, *Urodynamis*, and it may have a deep phylogenetic significance.

The long Lark-like hind claw of *Centropus* suggests at once that it is a terrestial bird; and, if we mistake not, the high course grasses in which it lives

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[1]) It is worthy of note that *Centropus* appears to have strong tendencies towards albinism. The Dresden Museum contains two perfect albinos of *C. viridis*, one perfect albino each of *C. ateralbus*, and *C. goliath*, one partial albino of *C. bengalensis*, and several such of *C. ateralbus*.

have to do with the curious spine-like character of the shafts of its contour-feathers. This grass ("Kussu kussu" *Chrysopogon aciculatus* Fr.) grows taller than a man and is so sharp that great care must be used in passing through it or hands and face get badly cut. Similar considerations have led us to examine the outer webs of the primaries, in anticipation that a change might have been wrought by frequent brushing against the stems of the jungle-grass as the bird flew in and out amongst it; but there is nothing remarkable about them, unless it be that the outer webs of the longest primaries are narrowed rather suddenly in their terminal third (more so than in other Cuckoos before us), while the third, fourth, fifth, sixth and seventh — the longest — are all very much of a length, forming a remarkably blunt-tipped wing. The same condition obtains among other birds in other members of the subgenus *Centrococcyx (C. eurycercus, C. viridis)*, in the subgenus *Centropus (C. senegalensis)*, and — though less distinctly — in the subgenus *Poliphilus (P. phasianus)*; but not in *Nesocentor (N. menebiki)* and *Pyrrhocentor (P. celebensis)*, in which the shafts of the contour-feathers are less spiny in character and suggestive of somewhat different habits of life. The interesting point is that in the former subgenera the narrowest part of the outer web of the longest quills is usually some distance from the tip, whereas just before the tip the web becomes a shade broader again. The case should be considered in connection with the racket-feathers of *Prioniturus*.

GENUS PYRRHOCENTOR Cab. Heine.

These Coucals may be distinguished by their having the culmen longer than the head, the hind toe and claw shorter than the middle and reversed fourth toe and claws, the wing very blunt and round, the primaries (6th to 8th longest) very little longer than the secondaries, the tail half as long again as the wing, the contour-feathers of the head, neck, and breast with stiffened shafts, not dense and close, but on the other hand loose and open. The young are not known, immature birds hardly differ from the adults. About 5 species are known, inhabiting the Philippines, Celebes and Kangean.

* 72. PYRRHOCENTOR CELEBENSIS (Q. G.).

Brown Coucal.

Two geographical races of this highly local species have been distinguished; they are:

+ 1. The typical Pyrrhocentor celebensis.

a. **Centropus celebensis** *(1)* Quoy & Gaim., Voy. Astrol. Zool. I, 1830, 230; Atlas Aves 1833, pl. 20; *(2)* Gray, Gen. B. II, 1846, 455; *(3)* Bp., Consp. 1850, I, 108; id., Consp. Vol. Zygod. 1854, 5; *(4)* Finsch, New Guinea 1865, 160; *(5)* Brügg., Abh. Ver. Bremen 1876, V, 60; *(6)* Shelley, Cat. B. XIX, 1891, 365, pt.; *(7)* Hartert, Kat. Senkenb. Mus. 1891, 150.

b. **Centropus bicolor** *(1)* Lesson, Tr. d'Orn. 1831, 137; *(2)* Blyth, J. A. S. B. 1843, XII, 946; 1845, XIV, 203; *(3)* Pucher., Rev. Zool. 1852, 472; *(4)* Hartl., J. f. O. 1855, 421; *(5)* Gray, P. Z. S. 1860, 359 (Gilolo!); *(6)* id., HL. 1870, II, 214; *(7)* Schl., Mus. P.-B. Cuculi 1864, 73; *(9)* Rosenb., Malay. Arch. 1878, 275 (?).

c. **Pyrrhocentor bicolor** *(1)* Cab & Heine, Mus. Hein. 1862, IV, 117; *(2)* Salvad., Orn. Pap. 1880, I, 365; *(3)* Heine & Rchnw., Nomencl. Mus. Hein. 1890, 205.

d. **Pyrrhocentor celebensis** *(1)* Wald., Tr. Z. S. 1872, VIII, 55; *(2)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 650; *(3)* Meyer, Ibis 1879, 70, 146 pt.; *(4)* W. Blas., J. f. O. 1883, 136; *(5)* Beddard, P. Z. S. 1885, 170, 172, 180, 187; *(6)* Guillem., t. c. 551; *(7)* W. Blas., Ztschr. ges. Orn. 1886, 98; *(VIII)* Meyer, Vogel-Skel. XVIII, 1892, 47, pl. CLXXII; *(9)* Vorderman, N. T. Ned. Ind. 1893, LII, 190, 191; *(10)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 6; *(11)* ? Hartert, Nov. Zool. 1896, 160.

e. ? **Pyrrhocentor celebensis celebensis** *(1)* Hartert, Nov. Zool. 1897, p. 160, 164.

"Koun-Koun" (Quoy & Gaim. *a I*) or **"Kung-Kung"** (Nat. Coll., Dresd. Mus.) near Manado.

"Kuwo", native Malay name, Meyer *3*.

"Unguno", Gorontalo, Joest, Das Holontalo 1883, 106.

"Ungung-gungo", Rosenb. *b 9*.

Figures and descriptions. Quoy & Gaimard *a I*, Meyer *d VIII* (skeleton); Pucheran *b 3*; Cabanis & Heine *c 1*; Brüggemann *a 5*; Salvadori *2*; Beddard *d 5* (pteryl. etc.); W. Blasius *d 7*; Shelley *a 6*.

Adult. Head, neck, throat and breast wood-brown, darker above, paler below, more drab-colour on head, passing on the rest of upper surface, wings, and tail into Mars- and walnut-brown; under tail-coverts, flanks and thighs of the same colour passing into wood-brown on the lower breast. Bill black, horn-brown at tip. In some specimens, it is yellowish white at the tip and over part of the lower mandible.

Adult male and female. Alike in coloration, the latter is perhaps a triple larger.

Immature. Differs little from the adult. The head, neck and breast is washed more strongly with a rufous tint, so that the colour here contrasts less strongly with that of the rest of the body, and across the throat a rufous collar is perceptible (Manado, C 5186, Limbotto ♀, C 1814).

Lord Walden remarks: "In *P. celebensis*, the fully adult bird loses the bright yellow-rufous chin-, throat-, neck-, and breast-plumage of the younger bird. These parts become very pale fulvous and contrast with the dark chestnut of the remaining lower region. . . . The young bird is bright rufous throughout" *(1)*.

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (C 1827) ♀ ad. Limbotto, July	182	280	50	30
b. (C 1801) ♀ ad. Limbotto, July	179	270	—	26.5
c. (C 1813) ♀ ad. Togian Is., Aug.	183	275	46	—
d. (C 1814) ♀ imm. Limbotto, July	159	224	—	23
e. (Salvad. *2*) ♀, Manado, July	190	275	—	—
f. (Sarasin Coll.) ♂, Kema, 20. VIII. 93	183	280	45	28
g. (Sarasin Coll.) ♂, Kema, 13. IX. 93	—	270	—	25
h. (Sarasin Coll.) ♂, Kema, 10. XI. 93	173	250	47	28
i. (Sarasin Coll.) ♂, Tomohon, 8. X. 94	175	295	—	24
j. (C 1810) ♂, Manado, March	173	261	43	25
k. (Salvad. *2*) ♂, Manado, July	170	250	—	—

We are also able to compare 32 other specimens, sex not indicated. One displays a white feather on the back, — partial albinism.

Skeleton *(VIII)*.

Length of cranium	70.0 mm	Length of tarso-metatarsus	45.0 mm
Greatest breadth of do.	28.0 »	Length of digitus III	41.0 »
Length of humerus	39.0 »	Length of sternum	27.7 »
Length of ulna	31.5 »	Greatest breadth of do.	25.5 »
Length of radius	28.7 »	Height of crista sterni	7.0 »
Length of manus	33.0 »	Length of coracoideum	28.7 »
Length of metacarpus	17.5 »	Length of scapula	38.0 »
Length of digitus princip.	14.0 »	Length of clavicula	28.0 »
Length of femur	48.0 »	Length of pelvis	50.0 »
Length of tibia	66.0 »	Greatest breadth of do.	29.0 »
Length of fibula	22.8 »		

Distribution. Minahassa (Voy. Astr. *a I*, Meyer *d 3*, Fischer *a 5*, *etc.*); Gorontalo (Forsten *1*, Meyer *d 3*); Togian Is. (Meyer *d 3*); *(?)* Bonthain Peak, S. Celebes (Doherty fide Hartert *e 1*).

Variation. The female from the Togian Islands in the Dresden Museum corresponds with adults from North Celebes in coloration, but the bill is yellowish white at the end, the under mandible being entirely of this colour except towards the base, where it becomes blackish. The feet are also paler. Several specimens from Celebes itself also offer some amount of pale colour on the bill. Hartert finds his specimens from Bonthain somewhat different.

2. Pyrrhocentor celebensis rufescens M. & W'g.

Abh. Mus. Dresden 1896, Nr. 2, p. 11; Hartert, Nov. Zool. 1897, 160, 164.

"Kung-kung", Tonkean, Nat. Coll.

Diagnosis. Differs from the typical form in having the face, neck, throat and breast light cinnamon-rufous, instead of wood-brown; head above clearer brown; mantle and wing-coverts redder brown.

Measurements. Wing 175—185 mm; tail 265—325; tarsus c. 46; bill from nostril 26—31.

Distribution. Eastern and Southern Peninsulas, Celebes; Tonkean (Nat. Coll.), Macassar (Wallace *a 6*, Doherty); Tanette, Mandalli, Maros (Meyer *d 3*); (if the same) Dongala, W. Coast (Doherty).

Observation. Seven specimens of this well-marked race were obtained by native collectors at Tonkean in the eastern part of the E. Peninsula. Meyer *(d 3)* when in Celebes remarked: "the South Celebean specimens appeared to me, when I first saw them, somewhat more brilliantly coloured than those of North Celebes, but afterwards, when I compared the skins in the cabinet, I could find no difference." There are now no specimens from the south in the Dresden Museum, but Mr. Hartert has recently received two from the low country north of Macassar, which "are hardly different from *P. c. rufescens*", and two skins from Dongala on the west coast which "resemble very much the co-types of *P. c. rufescens*", but "are a little paler and less rufous above where they look more like *P. c. celebensis*". A third skin from Dongala was aberrant. It still remains to be proved therefore whether these birds are intermediate: *P. celebensis—rufescens*, or what.

The genus *Pyrrhocentor* was established in 1862 by Cabanis and Heine for this species and *P. unirufus* C. & H. *(c 1)*, with the former for type. To

these *P. melanops* (Lesson) of the Philippine Islands, *P. kangeanensis* Vorderm. of the Kangean Islands, and a new species of Prof. W. Blasius (not yet described) from Mindoro may be added. The genus *Pyrrhocentor*, like *Centrococcyx* and some others, is not admitted as distinct in Shelley's Catalogue of the Cuckoos, where all the *Centropinae* are grouped together in the single genus *Centropus*; it appears to us nevertheless to be worthy of distinction as a genus for the following reasons:

Compared with *Centropus bengalensis* and *Centropus senegalensis* we find 1. that the contour-feathers are different in character; in *Pyrrhocentor* the shafts are fine though stiff, the barbs also are long and unconnected, hairlike for the most part of the feather; in *Centropus* and *Centrococcyx* the shafts are spinous, and the barbs have not such a hairlike appearance; 2. The primaries are different, the outer webs being rather suddenly narrowed in their distal half in *Centropus* and *Centrococcyx*, whereas in *Pyrrhocentor* the outer webs are proportionally broader, and the narrowing is slight and proceeds gradually from base to tip. The relative lengths of the primaries taken from specimens in which all the feathers appear to have obtained their normal length are as follows[1]):

	I	II	III	IV	V	VI	VII	VIII	IX	X
Pyrrhocentor celebensis	70	101	122	141	148	153	152	151	149	145
Pyrrhocentor sp. (Mindoro). . .	62	87	113	124	134	135	136	138	136	131
Centrococcyx bengalensis (a) . .	74	115	130	135	135	136	133	123	120	111
Centrococcyx bengalensis (b) . .	60	92	110	117	117	117	113	106	103	97
Centropus senegalensis	80	106	125	130	130	130	129	124	119	114

In *Pyrrhocentor*, as the above figures show, the first, second and third quills are relatively shorter than in *Centropus* and *Centrococcyx*; the maximum length is obtained from the sixth to the eighth feather, instead of the fourth to the sixth; the wing is still blunter, the quills seem weaker. The bird has all the appearance of being a very feeble flyer[2]). Consequently it is of the more value in questions concerned with the geographical distribution of birds. 3. The hind claw of *Pyrrhocentor* is much shorter. 4. The young of *Centrococcyx* and *Centropus* is rufous brown above barred with black; we have seen large numbers of *Pyrrhocentor*, but never one differing greatly from the adult. What the nestling is like is as yet unknown; if it is rufous barred with black this phase of plumage would appear to be of very short duration.

The nearest known ally of *P. celebensis* is Vorderman's recently described *P. kangeanensis* of the Kangean Islands, a group lying between Java and Celebes, though much nearer to the former island than to the latter. This form is much larger than *P. celebensis* and has the chestnut colour on the under parts of that

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[1]) Measurements taken from the base of the first primary.

[2]) It was not sent to us by our hunters from the islands of Manado tua, Mantehage, Lembeh, and Banka, six or eight miles from the coast of Celebes. In N. Celebes it is very common.

species replaced by an umber tint, and the back and the tail not red-brown, but umber-colour (Vorderman *9*).

Meyer found this bird very frequent during his residence from January till July in the Minahassa; he also met with it in South Celebes in September and October where it had previously been found, but not recorded, by Wallace. Platen does not seem to have come across it there, neither did Prof. Weber, the Drs. Sarasin, nor Mr. Everett send any specimens home from the south. Meyer remarks *(3)* that it makes a nest of brush-wood, like a Pigeon's nest, in trees in the deep forest, and feeds on fruits such as waringui, nutmegs, etc.; but this is much in need of confirmation; observations on its habits are wanting. When von Rosenberg *(b 9)* says that it is a bird which frequents by preference the high grass and bush and consigns its eggs to other birds he appears to have had *Centrococcyx bengalensis* and *Eudynamis melanorhyncha* in view, as well as this species.

SUBFAMILY PHOENICOPHAINAE.

In the Catalogue of Birds this subfamily is distinguished by its short rounded wing, which fits close to the body, and (from the *Centropodinae*) by the claw of the hind (first) toe being ordinary, not lengthened and Lark-like. In the more typical forms the nostril pierces the horn of the bill unprotected by any formation of skin. The bill is generally large and weak, the tail very long, broad and graduated. The genera seem to stand much nearer to the *Centropodinae* than the *Cuculinae*, or *Scythropinae*.

GENUS PHOENICOPHAES Vieill.

The Malkohas are birds about the size of a Magpie; the bill is large, very high and bloated at the base, compressed at the tip, yellow, green, or particoloured in hue, the nostril small, linear to round in shape, placed low down on the maxilla just above the tomia, the nasal canal running obliquely upwards; a row of stiff bristles over the eye; much of the face naked; feet rather small, the middle toe longer than the fourth by the length of its claw; wing very blunt, primaries overreaching the secondaries only by about half the length of the tarsus; tail 1½ times the length of the wing, or more, the outermost rectrix only about half the tail-length. There are seven species, ranging from Ceylon and Malacca to Celebes, and several of them have been distinguished as distinct genera, but on very slender grounds, depending on the shape of the nasal aperture. They feed principally, as is known from a few forms, on insects or fruit.

* 73. PHOENICOPHAES CALORHYNCHUS Temm.

Blue-tailed Malkoha.

In the Southern Peninsula of Celebes this well-marked species has the head of a lighter grey than in the birds of the north and east of the island and has been subspecifically distinguished therefrom. The two known races are:

† 1. The typical Phoenicophaes calorhynchus.

a. **Phœnicophaus calorhynchus**[1]) *(1)* Temm., Pl. Coll. 1825, pl. 349; *(2)* Less., Man. d'Orn. 1828, II, 128; *(3)* Cuv., Règne An. 1829, I, 456; *(4)* S. Müll., Verh. Natuurk. Comm. 1839—44, 234, note; *(5)* Blyth, J. A. S. B. 1845, XIV, 199; *(6)* Gray, Gen. B. 1846, II, 459; *(7)* Bp., Consp. 1850, I, 98; id., Consp. Vol. Zygod. 1854, 5; *(8)* J. & E. Verr., Rev. Zool. 1855, 356; *(9)* Schl., Mus. P.-B. Cuculi 1864, 48; *(10)* Finsch, Neu-Guinea 1865, 159; *(11)* Wall., Malay Archip. 1869, I, 429; *(12)* Gray, HL. 1870, II, 205; *(13)* Wald., Tr. Z. S. 1872, VIII, 52, fig. 5, head; *(14)* Brügg., Abh. Ver. Bremen 1876, V, 57; *(15)* Lenz, J. f. O. 1877, 371; *(16)* Rosenb., Malay. Arch. 1878, 275; *(17)* Meyer, Ibis 1879, 67; *(18)* Guillem., P. Z. S. 1885, 549; *(19)* Hickson, Nat. in N. Celebes 1889, 255; *(20)* Tristr., Cat. Coll. B. 1889, 83; *(XXI)* Meyer, Abb. von Vogelskel. 1897, pl. CCXXIX.

b. **Melias calyorhynchus** *(1)* Less., Tr. d'Orn. 1831, 132.

c. **Zanclostomus calorhenchus** *(1)* Blyth, J. A. S. B. 1842, 1098, 28.

d. **Phœnicophaus melanogaster** *(1)* Blyth (nec Vieill.), Cat. B. Mus. A. S. B. 1849, 75.

e. **Rhamphococcyx calorhynchus** *(1)* Cab. & Heine, Mus. Hein. 1862, IV, 65; *(2)* Sharpe, P. Z. S. 1873, 605, fig. of head; *(3)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 649; *(4)* Cab. & Rchnw., J. f. O. 1876, 324 (Ceram!); *(5)* Salvad., P. Z. S. 1877, 195; *(6)* id., Orn. Pap. 1880, I, 392; *(6bis)* W. Blas., J. f. O. 1883, 136; *(7)* id., Z. ges. Orn. 1886, 95; *(8)* Hein. & Rchnw., Nomencl. Mus. Hein. 1890, 201; *(9)* Shelley, Cat. B. XIX, 1891, 396; *(10)* Hartert, Kat. V. Mus. Senckenb. 1891, 149; *(11)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 6; *(12)* iid., ib. 1896, Nr. 2, p. 11.

"Wakeke" or **"Bakeke"** (Meyer *a 17*), **"Burong bakeke"** or **Makekeke"** (Nat. Coll.), near Manado.

"Koko-ondo" or **"Tontonbara"** (Meyer *a 17*), inland name, Minahassa, meaning Foreteller-bird by daytime ("Geloofvogel bij dag" — Dutch).

"Aluii", Gorontalo (Rosenb. *a 16*).

"Djee", Tonkean and Balante, E. Celebes (Nat. Coll.).

Figures and descriptions. Temminck *a 1*; Meyer *a XXI* (skeleton); Walden *a 13* (head fig.); Sharpe *e 2* (head fig.); Brüggemann *a 14* (juv.); Cabanis & Heine *e 1*; Shelley *e 9*.

Adult (North Celebes). Head above as far as nape dark mouse-grey; neck, mantle, scapulars and wing-coverts (except the greater series) chestnut; chin, throat and breast paler (burnt sienna or hazel); lower back, rump, and upper tail-coverts, abdomen, sides, under wing-coverts, flanks and thighs slaty, paler below, but passing into black on the under tail-coverts; wings and tail glossy dark violet-blue; the greater wing-coverts similarly coloured, but often broadly fringed with dark chestnut where they approximate the chestnut scapulars and median coverts (Manado, C 5177). Bill, tip white, then a black space about 10 mm wide, the rest

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[1]) The name of this species has been variously spelt *Phœnicophæus*, *Phoenicophaeus*, *Phœnicophaus*, *Phœnicophaës*, *calyorhynchus*, *calorhynchus*, *callirhynchus*, *calorhenchus*.

yellow, except about the nostril where it is red; under mandible red. "Iris reddish brown; tarsus black" (Guillem. *a 18*).

Sexes. Alike in coloration.

Young. Head above rust-red, the bases of the feathers grey. Rectrices about 40 mm longer than in the adult bird, proportionally narrower and not rounded off broadly, but more gradually pointed. Bill considerably smaller. Upper mandible olive-yellow, without a black space before the tip, but washed out olive-green, the tip itself blackish. Under mandible dirty red, along the ridge and at the tip yellowish (Brüggem. *a 14*).

Measurements.	Wing	Tail	Tarsus	Culmen
a. (C 1837) ad. Manado — March	181	316	43	46.5
b. (C 3575) ad. N. Celebes	180	321	42	44.5
c. (C 3577) ad. N. Celebes	180	330	42	45
d. (C 3572) ad. N. Celebes	174	325	42	44.5
e. (C 5176) ad. ♂ Manado	185	310	42	44.5
f. (C 5177) ad. ♀ Manado	185	312	41.5	40.5

Nest. "Makes a nest of twigs, like a Pigeon" (M. *a 17*); further observations would be welcome.

Distribution. Celebes — Minahassa (Wallace *10*, Meyer *a 17*, Platen *8*, Guillem. *a 18*, *etc.*); Gorontalo (Forsten *a 9*, Rosenb. *a 16*, Meyer *a 17*); Togian Islands (Meyer *17*); E. Peninsula, Tonkean and Balante (Nat. Coll.); Ussu, S. E. Cel. (P. & F. Sarasin); Kandari, S. E. Celebes (Beccari *3*).

2. Phoenicophaes calorhynchus meridionalis M. & Wg.

f. **Phœnicophaus calorhynchus** *(1)* Wall., Malay Archip. 1869, I, 340.

g. **Rhamphococcyx calorhynchus** *(1)* W. Blas., Z. ges. Orn. 1885, 262; *(2)* Platen, Gefied. Welt 1887, 218; *(3)* Shelley, Cat. B. XIX, 1891, 396 (Macassar); *(4)* Büttik., Zool. Erg. Weber's Reise 1893, III, 275.

h. **Rhamphococcyx calorhynchus meridionalis** *(1)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 2, p. 11

i. **Phœnicophaes calorhynchus meridionalis** *(1)* Hartert, Nov. Zool. 1896, 160; id., ib. 1897, 160, 164.

"**Zanissere**", Tjamba Distr., Platen *g 1.*

Diagnosis. Head above as far as the nape pale mouse-grey, instead of dark mouse-grey. "Iris blood-red; feet and orbits black" (Platen 7).

Observation. We have been able to compare over 70 examples from North Celebes and 11 from the East with 6 from the South, and find that the grey of the head is always darker in birds from the Northern Peninsula, but no other difference is apparent. Not one of these specimens is in the young plumage described by Brüggemann. The sexes are not only alike, but the young bird undoubtedly assumes the adult dress at a very early age.

Measurements.	Wing	Tail	Tarsus	Culmen
a. (C 12077) ad. ♂ S. Celebes, Tjamba, 4. V. 78	200	345	41	46
b. (C 12080) ad. ♂ S. Celebes, Tjamba, 10. IV. 78	202	313	44	46
c. (C 12075) ad. S. Celebes, Tjamba, 15. VI. 78	174	315	41	41.5
d. (C 12079) ad. ♀ S. Celebes, Tjamba, 10. IV. 78	180	310	44	46
e. (C 12078) ad. ♀ S. Celebes, Tjamba, 7. IV. 78	188	327	42	45
f. (C 12076) ad. ♀ S. Celebes, Tjamba, 19. IV. 78	193	328	43	45

Distribution. South and West Celebes: Macassar (Wallace *f 1*, *g 3*; Doherty *i 2*), Tjamba Distr. (Platen *g 1*, *g 2*), Loka, Luwu and Palopo (Weber *g 4*), Indrulaman (Everett *i 1*); W. Celebes, Dongala (Doherty *i 2*).

Specimens from East Celebes are similar to those of the North, but seem to be a shade darker. A specimen from S. E. Celebes in the Sarasin-Collection (Ussu, 20. II. 96) is also dark in coloration, and wants the ivory-white tip to the upper mandible, a condition which we have not seen in any specimen from the rest of the island. A female from West Celebes was found by Hartert to belong to the southern race.

This species has been placed in the special subgenus *Rhamphococcyx* of which it is the only species and peculiar to the Island of Celebes. Its nearest ally known is *Rhinococcyx*, a subgenus represented by one species only, *R. curvirostris* (Shaw and Nodder', of Java. The nostril of *Rhamphococcyx* is an elongated slit parallel to the gape, and the eye is surrounded by a bare space of smooth bluish grey skin; the nostril of *Rhinococcyx* is placed in a groove terminating in a widened, somewhat pear-shaped, orifice, and the bare space, which occupies most of the side of the head is red in colour and rugose in character, looking as through formed of rudimentary feathers, which sprout, but do not come to perfection. *Rhinococcyx* is again, as Dr. Sharpe has pointed out (Tr. Z. S. 1877, 321), closely allied to *Dryococcyx*, a subgenus in which the nostril is a small circular hole, situated in a deep perpendicular groove, which separates the lores from the upper mandible; it is known only by one species from the island of Palawan.

Urococcyx, recently distinguished by Capt. Shelley in the Catalogue of the Cuckoos (pp. 368, 398), was held to have round nostrils not placed in a groove, but Count v. Berlepsch (Nov. Zool. 1895, 72) has shown that in the species found in Borneo the nostril is oval; these forms are very like *Rhinococcyx curvirostris* in coloration, and in Capt. Shelley's system they come between *Rhinococcyx* and *Dryococcyx*, and consist at present of three species, one, *U. erythrognathus*, inhabiting Sumatra, the Natunas and Malacca as far as Tenasserim; one *U. borneensis* (Bp.), Borneo; while the habitat of the other, *U. aeneicauda* (J. and E. Verreaux), was unknown until quite recently, when it was found in Mentawei Id. off the W. coast of Sumatra by Modigliani (Salvadori, Ann. Mus. Civ. Gen. 1894, 590).

Sharpe *(e 2)* remarks on *P. calorhynchus*: "to the true *Phoenicophaes*, it is allied by the shape of the nostrils, but differs in its smooth face and feathered lores". Lord Walden had already called attention to this supposed affinity *(a 13)*, but it appears to us that the very different type of coloration places the typical subgenus *Phoenicophaes*, which is confined to Ceylon, in a position of much more remote relationship to *Rhamphococcyx*, *Urococcyx*, *Rhinococcyx* and *Dryococcyx*, which form a closely related group of subgenera, or, according to Count v. Berlepsch, the well marked species only of one genus, *Phoenicophaes*.

These forms, as indeed the whole of the *Phoenicophaeinae*, are of special

interest in questions concerned with the geographical distribution of animals. Among birds which appear to be stationary and settled, it is usual to find new species in localities separated by a narrow reach of sea or other geographical barrier; among the *Phoenicophaeinae* these barriers are often the means of separating forms which some authorities have distinguished as genera. Thus, *Rhamphococcyx* is confined to Celebes, *Rhinococcyx* to Java, *Dryococcyx* to Palawan, *Phoenicophaes* s. str. to Ceylon, *Dasylophus* to Luzon and Marinduque (Steere), *Lepidogrammus* to Luzon, *Hyetornis* to Jamaica, each of which genera Capt. Shelley finds to be represented by a single species; *Coua* with 12 species is peculiar to Madagascar.

The subfamily *Phoenicophaeinae* forms an important link between Celebes and Asia, no member of it being known from the Moluccas or any other part of the Australian Region. Owing to their structure and their habits the *Phoenicophaeinae* appear less likely than any Celebesian genera yet considered to have spread their range by flight over wide stretches of sea. The wing is very short and rounded, the tail very long; the length in the flesh of specimen "a" *(antea)* of *Phoenicophaes calorhynchus meridionalis* was found by Dr. Platen to be 550 mm, the wing is only 200 mm; Legge shows the wing to be only one-third the total length in the Ceylon species, *P. pyrrhocephalus* (B. Ceylon, 256); and Shelley's measurements prove that the same condition obtains throughout the subfamily, the total length being always more than twice, and often more than three times that of the wing.

It appears that these birds are rarely or never seen on the wing in the sense of taking long flights — at least this is the case with the Indian and East Indian forms. Davison remarks of *Rhopodytes tristis*: "Its flight is weak, and it relies more for its safety on the dense and impenetrable character of the places it prefers to frequent. It has a marvellous capacity for making its way through dense cover" (Str. F. VI, 163); and on the next page he remarks that the habits of *R. sumatranus* are similar. *Urococcyx microrhinus* in Borneo was found by Mottley to conceal itself among the brushwood and when disturbed to take only very short flights (Oates t. c. 125). *Rhinortha chlorophaea*, according to Davison, resembles *Rhopodytes* in all its habits (S. F. VI, 166). Legge speaks of the way in which *Zanclostomus* in Ceylon makes off, threading its way quickly through the most tangled underwood, but in places where it is common it may often be seen flying across roads. *Phoenicophaes* when flushed in the jungle flies up to high branches and quickly gets out of danger, taking short flights from tree to tree. Meyer found that *Phoenicophaes* in Celebes "does not fly away even after being shot at; it sits quiet if a bird by its side falls down; but I always got the impression that it is the fright which rivets it to the spot[1]). It flies quickly, or rather glides or slides through the foliage" *(a 17)*.

[1]) "Once" — continues Meyer, in a different connection — "some one told me, at Remboken, on the shores of the Tondano lake, that several years before such a bird flew, crying very loudly, over the village,

This gliding motion through the crowns of the trees is compared by Platen to the spectacle afforded at sea by a wandering troop of porpoises: "it is not flying nor hopping, but rather a rhythmical diving and disappearing in and out of the green, and it is impossible to form any approximate notion of the number of individuals" (Gefied. Welt 1887, 218). It will readily be imagined how this gliding mode of travelling is due to the parachute-like action of the great tail; the superior facility for settling afforded by this organ to the common Magpie *(Pica caudata)* is obvious [1]).

From their structure, therefore, these birds appear less capable than usual of sustained flight, and from observations on their habits it is found that they do not make use of their wings for this purpose; consequently there seems to be so much the less reason to suppose that their distribution took place by flight across the straits which separate their habitats.

As Shelley shows, the sexes of all the *Phoenicophaeinae* are similar in coloration, except, perhaps, in *Rhinortha*. *P. calorhynchus* follows the rule, and the young, as is often the case in genera in which the male and female are alike, assumes the adult plumage at a very early age. Young birds, according to Brüggemann, who alone seems to have received specimens, have the tail-feathers narrower and longer than in the adult, and the head rusty instead of grey. In this — the form of the tail-feathers — and in having a line of yellow along the ridge of the under bill they call to mind *Rhinococcyx* of Java.

Facts concerning the food of the Celebesian form are scanty; Meyer found that it feeds on insects; probably, however, its food — as its bill suggests — consists of fruits as well; Legge has found such to compose the chief diet of *Phoenicophaes* and *Zanclostomus* in Ceylon, through insects were discovered in the stomach as well, and Davison remarks that *Rhinortha chlorophaea* feeds "apparently entirely on insects", and a similar fare with the addition of small reptiles is ascribed by Oates to *Rhopodytes tristis* (Oates, B. Brit. Burmah II, 121,122).

SUBFAMILY SCYTHROPINAE.

This subfamily of the Cuckoos contains but a single species, *Scythrops novaehollandiae*, one of the largest Cuckoos, with a body as big as that of a Crow and a much larger bill and tail. Its plumage is Cuculine — brown upper surface, grey head, neck, and breast, and faintly barred under parts; it differs by its enormous bill, which is furnished on the basal half with a shallow groove by the side of the culmen and a second groove lower

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and that all the inhabitants became frightened as to what might happen"! A distructive fire which took place in the village next day was associated by the natives with this unusual behaviour of the "Foreteller-bird of the daytime".

[1]) De Bocarmé says that *Rhinococcyx* in Java is in the habit of sitting couched upon foliage supported by its tail and half open wings, but not grasping any bough with its feet (Schlegel, Cuculi 49).

down above the nostril. The nostril is oval, cartilaginous above, situated at the base of the maxilla; the wing is long and pointed, longer than the tail, the 3rd quill longest, slightly exceeding the 4th, the secondaries hardly reaching more than half the length of the wing. A partial migrant. Probably parasitical. Feeds on insects, seeds.

GENUS SCYTHROPS Lath.

Description as for the subfamily.

† 74. SCYTHROPS NOVAEHOLLANDIAE Lath.

Channel-bill.

Scythrops novae-hollandiae *(1)* Lath., Ind. Orn. 1790, I, 141; *(II)* Temm., Pl. Col. 1824, 290; *(III)* Vieill. & Oud., Gal. Ois. I, 1825, 27, p. 39; *(IV)* Less., Tr. d'Orn. 1831, 128 pl. 23, f. 1; *(V)* Lafresn., Mag. de Zool. 1835, pl. 37 (juv.); *(VI)* Küster, Orn. Atlas 1838, pt. 15, pl. 4; *(6bis)* Sal. Müller, Wieg. Arch. 1846, XII, 116; *(VII)* Gld., B. Austr. 1848, IV, pl. 90; *(8)* Wall., Ibis 1860, 147; *(9)* id., P. Z. S. 1863, 485; *(10)* Schl., Mus. P.-B. Cuculi 1864, 36; *(11)* Gld., Handb. B. Austr. 1865, I, 628; *(XII)* Diggles, Orn. Austr. 1866, pt. IV, pl.; *(13)* Wald., Tr. Z. S. 1872, VIII, 27, 51; *(13bis)* Rosenb., Malay. Arch. 1878, 275; *(14)* Meyer, Ibis 1879, 67; *(15)* Salvad., Orn. Pap. 1880, I, 372, and Agg. 1889, 52; 1891, 220; *(16)* Finsch, Mitth. Orn. Ver. Wien 1884, VIII, 93; *(17)* Meyer, Isis 1884, 18; *(18)* Guillem., P. Z. S. 1885, 549; *(19)* W. Blas., Ztschr. ges. Orn. 1885, 208, 260; *(20)* Ramsay, Pr. L. Soc. N. S. W. 1886, 1094; *(21)* North, ib. 1887, 410; id., ib. 1888, 1780; *(22)* Rams., Tab. List 1888, 15; *(23)* Cox & Hamil., Pr. L. Soc. N. S. W. 1889, 416; *(24)* Tristr., Cat. Coll. B. 1889, 82; *(25)* North, Nests & Eggs B. Austr. 1889, 248, pl. VII, fig. 3 (egg); *(26)* Shelley, Cat. B. XIX, 1891, 330; *(27)* Baldamus, Leben d. Kuckucke 1892, 154; *(28)* Newton, Dict. B. 1893, 84, 125 note; *(XXVIIIbis)* Meyer, Vogelskel. pt. XIX, 60, t. CLXXXV (1894); *(29)* M. & Wg., J. f. O. 1894, 241; *(30)* iid., Abh. Mus. Dresden 1895, Nr. 8, p. 6; *(31)* Hartert. Nov. Zool. 1896, 159, 243; *(32)* Salvad., Ann. Mus. Civ. Gen. 1896, 69.

a. **Australian Channel-Bill** *(I)* Lath., Syn. Suppl. 1801, II, 96, pl. 124; *(II)* id., Gen. Hist. 1822, II, 300, pl. 32.

b. **Scythrops australasiae** *(I)* Shaw, Gen. Zool. 1811, VIII, 2, 378, pl. 50.

c. **Cuculus praesagus** *(1)* Reinw., MS. fide Bp., Consp. 1850, I, 97; *(2)* Reinw., Reiz. Ind. Archip. in 1821, 1858, 592.

d. **Scythrops novae-hollandiae** var. **praesagus** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 56.

"Laebukua", Talaut (Nat. Coll.).

"Ulaäto", Bone, Gorontalo Distr. (Rosenb. *13bis*).

"Kapureh" near Manado ("Purej" — Nat. Coll.).

"Krok", Minahassa (Meyer *14*).

"Uriah", Tjamba Distr., S. Celebes (Platen *19*).

"Alo puti", Bonthain, S. Celebes (Ribbe & Kühn).

For further synonymy and references see Salvad. *15*; Shelley *26*.

Figures and descriptions. Latham *a I*, *a II*; Shaw *b I*; Temminck *II*; Vieillot *III*; Lesson *IV*; Lafresnaye *V*; Küster *VI*; Gould *VII*; Diggles *XII*; Meyer *XXVIIIbis* (skeleton); Salvadori *15*; W. Blasius *19*; North *25* (egg); Shelley *26*.

Adult. Upper surface (except head and neck) dark drab, the feathers of back, upper tail- and wing-coverts broadly terminated with blackish brown, terminal portion of quills blackish brown; tail crossed by a broad subterminal band (70 mm wide) of black, the lateral feathers marked on the inner webs with narrow bars of black, longest on the outermost pair, but generally not reaching to the shaft, the interspaces chiefly filled with pale cinnamon, tip of tail white, broadest (ca. 30 mm) on the lateral feathers; entire head and neck uniform cinereous, a little paler on chin and throat, becoming light grey with a pink wash on the breast, on which are very faint traces of bars; rest of under surface with a wash of buff, the bars becoming more distinct, especially on the flanks and under tail-coverts, where they are light drab-brown (nr. Manado, Aug.—Sept. 1892, C 10868). "Iris cherry-red; skin round eyes cherry-red; bill whity grey, darker at root; feet lead-grey" (Platen *19*).

In another specimen, probably older, marked Celebes — Riedel, Nr. 14009, the bars on the under surface are discernible only on the flanks, thighs and under tail-coverts.

Sexes. They are similar in plumage (Shelley *26*). Prof. W. Blasius *(19)* believes that the male has "a very considerably longer bill, with the point more strongly curved; a larger size in general, the colour of the upper surface somewhat darker, the barring of the under surface scarcely perceptible". Mr. Hartert draws attention to a female which is larger than a male specimen *(31)*.

Young. The cinereous of head, neck and breast of adult is chiefly occupied with feathers of pale cinnamon; back, wing-coverts and tail-coverts broadly terminated with pale cinnamon, usually preceded by a subterminal bar of blackish; ends of wings pale cinnamon and white; the broad white tip of tail washed with the same colour, the lateral tail-feathers mottled with bars of pale cinnamon and black on the outer as well as the inner webs; under surface deeper buff colour, the bars of drab-brown very distinct (N. Celebes — Riedel, Nr. 14010). "Iris light brown; skin round eyes cherry-red; bill whity grey, not darker at the base" (Platen *19*).

A somewhat older immature bird differs from the above in that the cinnamon tips of the feathers are fewer, narrower, and paler, being almost pure white on the quills and tail (Celebes, C 3580).

Egg. Dull white, with faint washed-out pinkish spots and minute dots, also some of a yellowish brown tinge. Size 38×27 mm (North *25*).

Breeding season in Australia. November (North *25*).

Measurements.

	Wing	Tail	Tarsus	Bill from nostril (straight)
a. (C 10868) ad. Manado, Aug.—Sep. 92	362	280	45	75
b. (14009) ad. Celebes	378	293	41	73
c. (C 11207) ♀ ad. S. Celebes, 31. March 93	350	281	44	66
d. (C 3580) juv. Celebes	348	275	41	52.5
e. (14010) juv. Celebes	315	257	—	45
e'. (Sarasin Coll.) ♀, Kema, Sept. 9	355	277	41	66
f. (13082) imm. Salibabu Id. 29. X. 93	356	288	—	62
g. (C 7400) ad. Ceram	354	270	—	71
h. (C 7401) ad. Ceram	342	265	—	69
i. (C 7403) ad. Ceram	320	253	—	58
j. (C 7402) ad. Ceram	320	255	—	68
k. (C 7399) ♀ ad. Aru	366	276	—	68
l. (C 10562) ♀ ad. Makisa	345	266	—	55.5
m. (Mus. Nehrk. Nr. 3821) juv. Australia	313	270	—	—

Skeleton.

Length of cranium	118.0 mm	Length of tarso-metatarsus .	48.0 mm
Greatest breadth of cranium .	44.5 »	Length of digitus I	26.5 »
Length of humerus	91.0 »	Length of digitus II . . .	38.0 »
Length of ulna	89.0 »	Length of digitus III . . .	52.0 »
Length of radius	82.0 »	Length of digitus IV . . .	51.0 »
Length of manus	88.0 »	Length of sternum	60.5 »
Length of metacarpus . . .	43.7 »	Greatest breadth of sternum .	51.0 »
Length of digitus I	17.0 »	Height of crista sterni . . .	18.5 »
Length of digitus II	40.5 »	Length of coracoideum . . .	46.5 »
Length of digitus III . . .	13.0 »	Length of scapula	60.0 »
Length of femur	64.5 »	Length of clavicula	47.0 »
Length of tibia	86.4 »	Length of pelvis	83.5 »
Length of fibula	40.0 »	Greatest breadth of pelvis .	45.0 »

Distribution. "Universally distributed over the whole continent of Australia" (North *21, 25*); Tasmania (North *21*); S. E. New Guinea, New Britain, Duke of York, Kei, Aru (Riedel *17*), Ceram, Buru, Obi major, Batchian, Ternate (cf. Salvad. *15*); Celebes — Minahassa (Forsten *10*, Reinw. *c 2*, Meyer *14*, Guillem. *18*), Gorontalo (Rosenb. *13bis*), Macassar (Wallace *26*), Tjamba, S. Celebes (Platen *19*); Flores (Allen *9, 15*); Talaut — Salibabu Id. (Nat. Coll. *29*).

This Cuckoo, the Channel-bill of Latham and of Australian ornithologists, is remarkable at once as being the largest of all the Cuckoos, and for the peculiar structure of its great bill. Prof. Newton *(28)* remarks that "its systematic position has often been disputed — its large and curiously grooved bill inducing some to refer it to the *Bucerotidae* (Hornbills), while its zygodactyle feet caused others to place it among the *Ramphastidae* (Toucans)". Count Salvadori *(15)* believes, that it might be made the type of a distinct subfamily constituted by Bonaparte; this we have adopted. The development of its plumage also affords points of interest; the immature bird presents certain analogies to the young of other Cuckoos of less aberrant structure, but the manner in which the cinnamon colour is confined to a single, large, ill-defined spot at the tip of the feathers of the upper surface seems to be peculiar to it.

Gould remarks that in New South Wales it is migratory, arriving in October and departing again in January *(VII, 11)*. Of late years no one in Australia appears to have paid further attention to the subject, except that Mr. North mentions it as a straggler in Cumberland County, N. S. W., and in Tasmania *(21)*. As Count Salvadori remarks, this migration is probably directed towards the equator, and that the species wanders to New Guinea from Australia, and during its migration extends its way to the Kei Islands, Moluccas, Celebes and the islands of the Timor Group. This conclusion does not, however, appear to be entirely correct, at least as regards the Minahassa, Celebes, where, as we are informed by Mr. Cursham, it is present all the year. Meyer found the bird very common in the Minahassa from January till July, and was informed that "during the east monsoon, when it is very dry (May till November), the bird cries much". It is a breeding species there as well as in

Australia, as is shown by von Rosenberg's statement that he once came into possession of an egg now in the Leyden Museum, which fell from the oviduct of a specimen killed by one of his hunters *(13bis)*, and a native told Meyer that he had once taken a young *Scythrops*, together with a young Crow out of a Crow's nest. The bird is often to be seen along with Crows *(14)*.

The plumage of the species in all localities appears to be very similar and stable; in dimensions of wing, bill and tail, however, it is an unusually variable bird. Probably, as Prof. W. Blasius remarks, the bill in the male is larger than in the female.

In Celebes it flies in large flocks, and feeds on fruits, such as the waringui *(14)*. Gould mentions large insects as its food. Latham says that "in the crop and gizzard the seeds of the red gum and peppermint trees have been found . . . exuviae of beetles also".

It is probably parasitical, but positive evidence on this point is still wanting. In Gould's Handbook an amusing account of the behaviour of a young *Scythrops* is given. Immediately it was put into the aviary it showed signs of hunger by opening its mouth, and had its wants promptly and carefully attended to by a Laughing Jackass *(Dacelo gigas)*.

ORDER BUCEROTES.

The order contains the single family of the Hornbills, "a very natural and in some respects an isolated group, placed by Prof. Huxley among his *Coccygomorphae*" (Newton), furnished with a bill of large or very large size, supported internally by a bony cellular structure, usually furnished at the base with a peculiarly shaped casque, and having a normal foot — three toes in front and the hallux behind. In size they vary from that of a domestic Pigeon to that of a Turkey; the plumage is usually of a pie-bald character, the tints being abruptly located, and the colours displayed are few, chiefly black, white, and various browns, while blue and red (except on the bare parts of the skin) are absent; in this they differ from the Toucans. The upper eyelid is provided with a row of stiff lashes; the wing is of moderate length, 11 primaries, the outermost one small and often curiously attenuated, the secondaries long; tail long, consisting of 10 feathers. Food: fruit and seeds, "the bigger species also capture and devour a large number of snakes, while the smaller are great destroyers of insects . . . They breed in holes of trees, laying large white eggs, and when the hen begins to sit the cock plasters up the entrance[1]) with mud

[1]) Sometimes before ever the eggs are laid.

or clay, leaving only a small window through which she receives the food he brings her during her voluntary imprisonment" (Newton, D. B. 437).

For anatomical characters see Grant, Cat. B. XVII 1892, 347; Blanford, Faun. Br. Ind., B. III 1895, 140; Gadow, Bronn's Kl. u. Ord. VI, 4, Av. II, p. 234 (1893).

FAMILY BUCEROTIDAE.

Map VII.

The characters as for the order. The family is divided by Elliot and Grant into two subfamilies, *Bucorvinae* (or *Bucoracinae*) and *Bucerotinae*, the former contains only one genus confined to Africa and distinguishable from all other Hornbills by its long tarsus, twice as long as the middle toe and claw, the latter with about 20 genera, belonging to the Indian countries, the East India Archipelago, and Africa, having a short tarsus about equal to or shorter than the middle toe and claw.

GENUS RHABDOTORRHINUS M. & Wg.[1])

The small Celebesian Hornbill is somewhat bigger than a crow, the bill very large, not furnished with a prominent casque, but in the adult the culmen is drawn up into a high sharpe ridge covering more than the basal two-thirds of the bill, with three parallel longitudinal ridges on the side of the maxilla; some transverse ridges occasionally at the base of the lower mandible; the nostril broad oval, situated at the base of the maxilla between the two lowest ridges and partially protected by feathers. The genus consists of a single species, in which the sexes are different, the female being black, the male having a yellow face and throat (changing to white after death with time and exposure of the skin).

† * 75. RHABDOTORRHINUS EXARATUS (Temm.).

Lesser Celebesian Hornbill.

a. **Buceros exarhatus** "Reinw." *(1)* Temm., Pl. Col. 1823, II, 91, pl. 211 (♀); *(2)* Wagl, Syst. Av. Buceros 1827, Nr. 15; *(3)* Less., Man. d'Orn. 1828, II, 107; *(4)* Schl. & Müll., Verh. Natuurk. Comm. 1839—44, Aves 23; *(5)* Reinw., Reis Ind. Archip. in 1821, 1858, 592; *(6)* Gray, HL. 1870, II, 128.

b. **Buceros exarhætus** *(1)* Blyth, J. A. S. B. 1847, XVI, 997.

c. **Buceros exaratus** *(1)* Gray, Gen. B. 1847, II, 400; *(2)* Blyth, Cat. B. Mus. As. Soc. 1849, 44; *(2bis)* Gray, P. Z. S. 1860, 356 (Moluccas!); *(3)* Schl., Mus. P.-B. Buceros 1862, 10; *(4)* Finsch, New Guinea 1865, 162; *(V)* Wald., Tr. Z. S. 1872, VIII, 47, pl. V; *(6)* Brügg., Abh. Ver. Bremen 1876, V, 56; *(7)* Lenz, J. f. O. 1877, 370; *(8)* Rosenb., Malay. Archip. 1878, 274; *(9)* Meyer, Ibis 1879, 65; *(9bis)* Salvad.,

[1]) ῥαβδωτός = striatus, ἡ ῥίς, ῥινός = nasus.

Orn. Pap. 1880, I, 401; *(10)* W. Blas., Ztschr. ges. Orn. 1885, 249; *(11)* Hickson, Nat. in N. Celebes 1889, 20; *(XII)* Meyer, Vogelskel. 1892, pt. XVII, 43, pl. CLXIX.

d. **Hydrocissa exaratus** *(1)* Bp., Csp. 1850, I, 90; *(2)* Dubois, Bull. Mus. Belg. 1884, III, 210.

e. **Anorrhinus exaratus** *(1)* Bp., Consp. Vol. Anisod. 1854, 2; *(2)* W. Blas., J. f. O. 1883, 136.

f. **Hydrocissa exarata** *(1)* Elliot, Monogr. Bucerot. 1878, pp. XIX, XXIII, XXVIII, fig. head (*enarhatus*—err.), pl. 46, text; *(2)* Tristr., Cat. Coll. B. 1889, 95; *(3)* Heine & Rchnw., Nomencl. Mus. Hein. 1890, 169; *(4)* Hartert, Kat. Mus. Senckenb. 1891, 139.

g. **Penelopides exaratus** *(1)* Grant, Cat. B. XVII, 1892, 376; *(2)* Hart., Nov. Zool. 1897, 164.

Rhabdotorrhinus exaratus *(1)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 6; *(2)* iid., ib. 1896, Nr. 1, p. 8; *(3)* iid., ib. 1896, Nr. 2, p. 11.

"**Karaka**" (Meyer *c 9*), "**Karkar**" (Nat. Coll.), native Malay name, Minahassa.

"**Karokok**", Alfurous, N. Minahassa (M. *c 9*).

"**Kerek-kerek**", Tondano, Minahassa (M. *c 9*).

"**Hele-hele**" (Rosenb. *c 8*).

"**Tolo-tolo**", Tjamba, S. Celebes (Platen *c 10*).

"**Tahutahu**", Tonkean, E. Celebes (Nat. Coll.).

Figures and descriptions. Temminck *a I*; Walden *c V*; Elliot *f I*; Meyer *c XII* (skeleton); Brüggemann *c 6*; W. Blasius *c 10*; Grant *g 1*.

Old male. Sides of head including forehead, superciliary region, ear-coverts, cheeks, chin and throat pale lemon-yellow (soon fades into white); all other parts black, on back and wings strongly glossed with green; a low casque on bill, reaching to within 20 mm of the tip, rather sharply ridged along the culmen and furnished on the sides with 3 additional ridges and furrows (Manado, C 8119). "Iris red-brown; orbit citron-yellow" (Platen *c 10*).

"Iris crimson, eyelashes black, orbit bright crimson; feet black, soles ochreous; bill pale horn-colour, casque dull ferruginous" (Doherty *g 2*).

Younger male. Like the adult, but the bill much smaller and the casque with its ridges and furrows imperfectly formed. In the old male and female the upper and lower mandibles do not close, except at the basal part and at the tip; in the young bird the edges seem to meet properly all along the bill (Paguatt, Sept., C 8117).

Adult female. Like the male, but the sides of the head, chin and throat, like the rest of the plumage, black; size generally a little smaller (Manado, Nr. 7708). "Iris red-brown; orbit black" (Platen *c 10*).

Measurements. Males — wing 218—252 mm; tail 180—222; rictus 88—102; length in the flesh 480—570; expanse 670—800; from tip of wing to tip of tail 150—170.

Females — wing 205—233 mm; tail 176—203; rictus 83—98; length in the flesh 450—500; expanse 650—760; from tip of wing to tip of tail 140—155 (Blasius and Platen *c 10*).

Skeleton (juv.).

Length of cran. fr. snt. nasofr.	40.0 mm	Length of tarso-metatarsus	45.0 mm
Greatest breadth of cranium	38.7 »	Length of digitus III	44.0 »
Length of humerus	64.0 »	Length of sternum	55.0 »
Length of ulna	88.0 »	Greatest breadth of sternum	34.4 »
Length of radius	81.0 »	Height of crista sterni	10.5 »
Length of manus	59.0 »	Length of coracoideum	40.0 »
Length of metacarpus	34.5 »	Length of scapula	48.0 »
Length of digitus principalis	21.0 »	Length of clavicula	30.5 »
Length of femur	54.5 »	Length of pelvis	55.0 »
Length of tibia	79.5 »	Greatest breadth of pelvis (pub.)	35.0 »
Length of fibula	28.5 »		

Egg. Von Rosenberg, to whom a rotten egg of this species was brought, describes it as rough-shelled, dirty white, and of the size of a Pigeon's egg *(c 8)*.

Nest. Meyer *(c 9)* was informed that "it makes its nest in hollow-trees or between wood, and lays two eggs"; but particulars as to whether the female is walled in with mud by the male are wanting.

Distribution. Celebes — Minahassa (Reinwardt *a 5*, Forsten *c 3*, etc.); Lembeh Id. (Nat. Coll.); Paguatt, Gulf of Tomini (Meyer *c 9*); Mapane (P. & F. Sarasin *2*); Tonkean, E. Celebes (Nat. Coll.); Macassar (Wallace *g 1*); Tjamba (Platen *c 10*); Tawaya, W. Celebes (Doherty *g 2*).

Mr. Elliot *(1)* adds "Malacca" as a locality of this species with Meyer's name as collector, and Dr. Dubois likewise records a specimen, or specimens, in the Brussels Museum as having been obtained by Meyer in Malacca. Meyer never did any collecting in Malacca, and the notice of this locality rests upon mislabelling due to other hands than his.

The genus *Hydrocissa* was, as Mr. Elliot says (Bucerot. pl. XI, text), proposed by Bonaparte *(d 1)* for various species "not nearly related beyond the fact that they belong to the same family". Mr. Elliot and Mr. Grant agree in placing them in three distinct genera, two of which, *Anthracoceros* and *Anorrhinus* were made by Reichenbach a little prior to Bonaparte, the first containing his *Hydrocissa monoceros*, *pica* and *violacea* (synonyms of *A. coronatus*) and *malayana*, while *Hydrocissa galerita* is the type of *Anorrhinus*, a genus which Grant finds to be represented by this species alone. The sixth and last species of Bonaparte's *Hydrocissa*, *H. exarata* of Celebes, is thus alone left in the genus. By Rule 5 of the Stricklandian Code Elliot would be fully justified in allowing the generic name *Hydrocissa* to stand for *exarata*, no type of the genus having been at first specified by Bonaparte, though *monoceros* stands first in the list, were it not that four years later Bonaparte in his Conspectus Volucrum Anisodactylorum, p. 2, distinctly signifies *monoceros* as his type by placing that species (with its synonym, *pica*) alone in the genus *Hydrocissa* and by relegating *exaratus* to the genus *Anorrhinus* Rchb., thus making it unlawful for any subsequent author to transfer the name *Hydrocissa* to any other part of the original genus (see Rules of Zool. Nomencl. 1863 § 5). Grant, therefore, rightly makes *Hydrocissa* a synonym of *Anthracoceros*; but, as we cannot agree with him that *Buceros exaratus* belongs to the Philippine genus, *Penelopides*, we find it necessary to give it a new generic name, *Rhabdotorrhinus*.

R. exaratus, the sole species of this genus, has in Elliot's opinion "no ally in the family, and is remarkable for its crest-like casque, hardly to be distinguished from the maxilla, and is moreover peculiar for the lateral grooves running its entire length. It . . . is probably the sole survivor of a subgroup of this family" *(f 1)*.

Penelopides has a small, smooth, somewhat tubular-looking epithema, and the basal part of the bill is furnished with a thin side-plate on one or both mandibles, which is notched or ribbed, as is sometimes the case in the lower man-

dible of *R. exaratus*. A broad band of rufous occupies more or less of the middle of the tail in *Penelopides*; in *Rhabdotorrhinus* it is uniform black.

Very little has been recorded of the habits of this species. Meyer *(c 9)* observed: "These birds live in pairs together. Their flight is heavy and slow. They feed on fruits, such as the waringuin *(Urostigma)*; and large flocks are often to be seen together on high fruit-trees. A common bird, not restricted to the north-eastern parts of Celebes. [A MS. note says they were rare until May 14th, and then became very plentiful.] I also found it in Paguatt, in the Gulf of Tomini, in September". The cousins Sarasin got it at Mapane, N. Central Celebes, and the native hunters working for the Dresden Museum killed a specimen with strongly developed ridges and furrows at the base of the lower mandible in East Celebes; Wallace and Platen obtained it also in the Southern Peninsula, but it was not sent by Beccari from S. E. Celebes nor by Meyer from the Togian Islands. No Hornbill has been recorded from the Sangi Islands. Observations on the wanderings of the species in the island are altogether wanting; such is also the case as regards their breeding habits. As Mr. Oates remarks (B. Brit. Burmah II, 91) the breeding female of all species of *Bucerotidae* as far as is known is walled in by the male with mud, etc., a narrow opening only being left, through which the male provides his mate with food. A. D. Bartlett made the surprising discovery on a species in 1869 (P. Z. S. 142; Flower, ib. 150; Murie, ib. 1874, 420—425) that the bird *(B. corrugatus)* has the habit of ejecting a sack like a fig, formed of the epithelial lining of its stomach, filled with undigested fruit. The power of throwing up this sack was supposed by Mr. Bartlett to be possessed only during the breeding season by the male, which thus transfers at a lump the whole contents of his stomach to his imprisoned female; but actual observations in confirmation of this interesting view appear to be still entirely wanting (cf. Newton, D. B. 437). Mr. Whitehead says the food is brought by six or seven other birds (Expl. Kini Balu, 50).

Bingham gives (Str. F. VIII, 459 sq.) interesting observations as to the plastering-up of the female in the nesting cavity by the male before she has begun to lay. The object of this curious process is regarded as a protective one, though it is not exactly known against what foes; the natives of Ceylon attribute it to the bird's fear of monkeys (Horsf. & Moore, Cat. B. Mus. As. Soc. 589; Legge, B. Ceylon 274), as does also Mr. Whitehead in Borneo (Expl. Kini Balu, 1893, 50). In New Guinea and elsewhere, where monkeys are absent, the male also walls in the female. Bernstein (J. f. O. 1861, 116, 117) ascertained from personal observation that the female of *Rhytidoceros plicatus*, the only species found east of Celebes, is similarly plastered up by the male, and is of opinion that *Pteromys* and the larger species of *Sciurus* are more dangerous foes to it than monkeys could be. After sitting for a time, the female loses nearly all her quills and tail-feathers and becomes incapable of flight, and Mr. Gammie remarks on *Aceros nepalensis* (Hodgs.) in Sikkim that she "is

said not to leave the nest from the time of her entrance till she comes out with her young ready for flight, a period of about three months" (Oates, Hume's Nests & Eggs III, 79).

GENUS CRANORRHINUS Cab. Heine.

The size of an Eagle; bill very large, narrow and decurved, yellow, with a transversely ribbed plate at its base, a large and high smooth epithema, in shape somewhat like the crest of a Grecian helmet, covering the basal half of the culmen and the crown; the nasal aperture round, situated in the crevice formed at the junction of the casque with the maxilla, and concealed by bristles; throat, cheeks, and periocular skin naked; first primary more than half the length of the wing and not greatly attenuated. Sexes dissimilar. The type of the genus is *C. cassidix*. Three other species included therein by Elliot and Grant are aberrant, and a greater uniformity of generic division might be obtained by restricting this genus to *C. cassidix*.

+ * 76. CRANORRHINUS CASSIDIX (Temm.).

Greater Celebesian Hornbill.

a. **Buceros cassidix** *(1)* Temm., Pl. Col. 1823, II, 66, pl. 210 (♂); *(2)* Wagl., Syst. Av. Buceros 1827, Nr. 3; *(3)* Less., Man. d'Orn. 1828, II, 105; *(IV)* Griff., An. Kingd. 1829, II, 434, pl.; *(5)* Less., Tr. d'Orn. 1831, 253; *(VI)* Schl. & Müll., Verh. Natuurk. Comm. 1839—44, Aves, p. 24, pl. 4 (♀); *(7)* Gray, Gen. B. 1847, II, 399; *(8)* Reinw., Reis Ind. Archip. in 1821, 1858, 591; *(9)* Sclat., Ibis 1859, 113; *(10)* Schl., Mus. P.-B. Buceros 1862, 9; *(11)* Finsch, Neu Guinea 1865, 162; *(12)* Wall., Mal. Archip. 1869, I, 364, 429; *(12bis)* Marshall, Schädelhöcker der Vög. (Nied. Archiv Zool. I) 1872, 33, 41, pl. XI, fig. 10; *(13)* Brüggem., Abh. Ver. Bremen 1876, V, 56; *(14)* Rosenb., Mal. Archip. 1878, 273; *(15)* Büttik., Zool. Erg. Weber's Reise in Ost-Ind. 1893, III, 275.

b. **Calao (Cassidix) cassidix** *(1)* Bp., Consp. 1850, I, 90.

c. **Rhyticeros (Cassidix) cassidix** *(1)* Bp., Consp. Vol. Anisod. 1854, 3.

Cranorrhinus cassidix *(1)* Cab. & Hein., Mus. Hein. 1862, IV, 173; *(2)* Wald., Tr. Z. S. 1872, VIII, 47, fig. 1—4; *(3)* Lenz, J. f. O. 1877, 370; *(IV)* Elliot, 1878, pp. XVIII, XXIX, XXXVI, pl. XVI text; *(5)* Meyer, Ibis 1879, 65, 146; *(6)* W. Blas., J. f. O. 1883, 136; *(7)* id., Ztschr. ges. Orn. 1885, 254—260; *(8)* Guillem., P. Z. S. 1885, 54; *(9)* id., Cruise Marchesa 1886, II, 188; *(10)* Platen, Gefied. Welt 1887, 219; *(11)* Hickson, Nat. in N. Celebes 1889, 255; *(12)* Heine & Rchw., Nomencl. Mus. Hein. 1890, 170; *(13)* Hartert, Kat. Senckenb. Mus. 1891, 140; *(14)* Grant, Cat. B. 1892, XVII, 377; *(15)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 7; *(16)* iid., ib. 1896, Nr. 2, p. 11; *(XVII)* Meyer, Vogelsk. 1894 pl. 190, 192—4.

d. **Buceros (Cranorrhinus) cassidix** *(1)* Gray, HL. 1870, II, 129; *(2)* Dubois, Bull. Mus. Belg. 1884, III, 192.

"**Alo**", Tondano (Reinw. *a I, a 10*).

"**Burong-taun**" (Year-bird), Minahassa (Meyer *5*).

"**Uwak**" (Meyer *5* and Nat. Coll.), native name, Lotta, Minahassa.

"**Ngak**", Tonkean, E. Celebes (Nat. Coll.).
"**Ahlo**", Gorontalo (Rosenb. *a 14*).
"**Pankao**", Tulabello, Gorontalo Distr. (Rosenb. *a 14*).
"**Alo**", Tjamba, S. Celebes (Platen *7*).

Observation. It is curious, considering the great diversity of language in Celebes, that the native name for this bird is the same in Tondano, Gorontalo and Tjamba, that is from the north to the south.

Figures and descriptions. Temminck *a I*; Griffith *a 4*; Schlegel & Müller *a VI*; Elliot *IV*; Marshall *12bis* (skull in section fig.); Walden *2*; Lenz *3*; W. Blasius *7*; Grant *14*; Meyer *XVII* (skel.).

Adult male. Head, where not covered by the casque, and nape dark chestnut; ear-coverts and entire neck light golden ochraceous; tail white; rest of plumage black, with a green gloss on the upper surface (Gorontalo, C 12173). Iris light brown to red; feet black, soles of the feet grey; claws black; bill yellow, base brownish, with dark brown bands; chin brownish red; round the eyes deep blue; throat light blue, with a dark blue patch in the middle. The casque is smooth in life; and the wavy uneveness in dried specimens is only in consequence of its shrivelling up after death (Meyer *5*).

Dr. Guillemard *(8)* writes: "Iris bright orange; feet black. Length of adult male about 104 cm; weight 5 lb. 3 ozs. Bill orange-yellow; the basal plaques dull red anteriorly; casque dull red; base of throat cobalt-blue, marked with two patches of black and one of dark blue".

The colours of the soft parts in a fine adult male in the Sarasin Collection are indicated as follows: "iris yellow-red; skin of cheeks white and Prussian blue; throat-sack white-blue, across it in the middle a broad Prussian blue band, behind this on either side a black streak; feet black; bill yellow horn-red" (♂, Kema, 19. Aug. 93: P. & F. S.).

Adult female. Like the adult male but smaller, and with the plumage of the head and neck black like the body. Casque yellow.

It is likely that the ribbed plates at the base of the bill are renewed yearly, and that the number of ribs increases with age. A belief that one rib is added to the bill-plates each year has given rise to the name by which the bird is known in the Minahassa, "Burong-taun" or Year-bird (Meyer *5*, Blasius *7*).

Young male. Like the adult female, but with the black plumage of the neck varied with tawny and some of the bases of the black feathers are of this colour; nape varied with chestnut feathers; casque as in female, but lower; bill shorter, base furnished with a thin covering without ribs (Manado, Nr. 8106).

Another specimen is like the last, but has the bill rather larger, and only here and there a tawny feather in the black neck. This may be a female, as some sprouting feathers in the neck are black, none tawny (Lotta, C 12091).

Measurements. Males (3 specimens) — length in the flesh 850—920 mm; expanse 1300—1400 (Platen *7*); (9 specimens) wing 400—470 mm; tail 270—328; rictus 175—230 (Blas. *7*, Dresden Mus. and Sarasin Coll.).

Females (9 specimens) — length 700—830 mm; expanse 1000—1270 (Platen *7*); wing 354—394; tail 234—283; rictus 165—185 (Blas. *7*).

Eggs. Unknown.

Skeleton.

Length of cranium	252.0 mm	Length of tarso-metatarsus .	63.0 mm
Greatest breadth of cranium .	60.3 »	Length of digitus I	52.0 »
Length of humerus	123.0 »	Length of digitus II . . .	63.0 »
Length of ulna	188.0 »	Length of digitus III . . .	76.0 »
Length of radius	166.0 »	Length of digitus IV . . .	73.0 »
Length of manus	112.0 »	Length of sternum	105.0 »
Length of metacarpus . . .	67.0 »	Greatest breadth of sternum .	63.5 »
Length of digitus I	21.6 »	Height of crista sterni . . .	25.0 »
Length of digitus II . . .	44.0 »	Length of coracoideum . . .	65.0 »
Length of digitus III . . .	20.0 »	Length of scapula	88.0 »
Length of femur	93.0 »	Length of clavicula	65.0 »
Length of tibia	127.0 »	Length of pelvis	111.0 »
Length of fibula	100.0 »	Greatest breadth of pelvis .	64.0 »

Nest. Rosenberg *(a 14)* states that the female is walled-in with mud into the nesting-cavity by the male, but he does not seem to write from personal observation. Meyer *(5)* says that the nest is built on the tops of the highest trees.

A female before us has the quills worn in a remarkable way, as if she had performed incubation under the conditions observed in Africa, India, Java etc.

Distribution. Celebes — Minahassa (Reinwardt *a I*, *a 8*, *a 10*, Forsten *a 10*, etc.); Gorontalo (Rosenberg *a 14*, Meyer *5*); Lembeh Id. (Nat. Coll.); Togian Islands (Meyer *5*); Tonkean, E. Celebes (Nat. Coll.); Macassar (Wall. *a 9*, *a 12*, *14*); Tjamba, S. Celebes (Platen *7*), Maros and Luwu (Weber *a 15*).

Cranorrhinus cassidix of Celebes is the type of the genus originally made for it and *C. corrugatus* of Malacca, Sumatra and Borneo by Cabanis & Heine in 1862. Though *C. corrugatus* is retained in the genus by Elliot and by Grant, it is a very different species, both as regards coloration and form of casque. The nearest ally of *C. cassidix* is *C. leucocephalus* of Mindanao and the small island of Camiguin off the north coast of Mindanao, a species differing chiefly from *C. cassidix* in having a narrow band of black at the end of the white tail, the casque laterally corrugated, not smooth, and the ribbed plate on the side of the bill present only on the mandible. It is interesting to note that the tail of *C. cassidix* is sometimes tipped on a few feathers (young ♂ 3rd June, Tjamba, C 12174), or spotted near the tip, with black; in one adult male in the Dresden Museum one of the two middle rectrices has a long streak of black on its terminal third. Prof. W. Blasius, with his usual exactitude of observation, remarks that such spots were not present in the nine adult females from South Celebes examined by him; nor are they to be seen in the females in the Dresden Museum. A female of *Rhytidoceros plicatus* from Ceram has an outer rectrix on the inner web margined with black of irregular width throughout its length (C 12175).

In his great work on the Hornbills Mr. Elliot appears to have attached, if anything, a too great value to the shape of the epithema and not enough to the coloration of the plumage, for the casque appears to be the most variable character in the family and has been modified into all sorts of shapes, whereas the general types of plumage are probably much more stable. The genus

most nearly allied to *Cranorrhinus* is unquestionably *Rhytidoceros*, the members of which correspond with *Cranorrhinus cassidix* very closely in general coloration, much better than do *Cranorrhinus corrugatus* and *waldeni*; indeed the latter are as much entitled to generic distinction from *C. cassidix* as are the species of *Rhytidoceros*. *Rhytidoceros* occurs both west and east of Celebes, the four species having the following distribution: *R. undulatus* from Cachar and Pegu down the Malay Peninsula to Sumatra, Borneo and Java; *R. subruficollis* with much the same distribution but not known in Java; *R. narcondami* from the small island of Narcondam in the Bay of Bengal about 170 miles due S. from Cape Negrais; and *R. plicatus* (with its subspecies *ruficollis*) ranging from the Moluccas over New Guinea to the Solomon Islands (Grant, Cat. B. XVII, 1892, 382 sq.).

It is instructive to see how the conclusions deduced from the geographical distribution of the members of one family may be partly undone, partly confirmed, on considering that of another family. The *Bucerotidae*, like the *Phoenicophaeinae*, consist of many narrowly located genera; were the generic distinctions as finely drawn as in the *Phoenicophaeinae* several more generic names would have to be bestowed.

Map VII. Distribution of the Hornbills of the East Indies.

	Nr. of species in genus	Indo-China	Tenasserim	Malacca	Sumatra	Borneo	Java	Philippines	Celebes	Moluccas	Papuasia
1. *Buceros*	2	.	.	†	†	†	†	.			
rhinoceros	.	.	.	*	*	*					
sylvestris	.	.	.	.	.	.	*				
2. *Dichoceros*	1	†	†	†	†						
3. *Hydrocorax*	3	.	.	.	.	.	.	†			
4. *Anthracoceros*	5	†	†	†	†	†	†	Sooloo			
convexus	.	.	.	*	*	*	*				
malayanus	.	.	.	*	*	*					
montani	.	.	.	.	.	.	.	Sooloo			
5. *Gymnolaemus*	1	.	.	.	.	.	.	Palawan			
6. *Penelopides*	6	.	.	.	.	.	.	†			
7. *Rhabdotorrhinus*	1	.	.	.	.	.	.	.	†		
8. *Cranorrhinus*	4	.	.	†	†	†	.	†	†		
cassidix	.	,	.	.	.	.	.	.	*		
leucocephalus	.	,	.	.	.	.	.	*			
corrugatus	.	.	.	*	*	*					
waldeni	.	.	.	.	.	.	.	*			
9. *Rhytidoceros*	4	†	†	†	†	†	†	.	.	†	†
undulatus	.	*	*	*	*	*	*				
subruficollis	.	*	*	[*]	*	*					
plicatus	.	.	.	.	.	.	.	.	.	*	*
10. *Anorrhinus*	1	.	†	†	†	†					
11. *Berenicornis*	1	.	†	†	†	†					
12. *Rhinoplax*	1	.	†	†	†	†					

The range of the *Phoenicophaeinae* ceases at Celebes, and the Celebesian subgenus *Rhamphococcyx* finds its nearest ally in the Javan subgenus *Rhinococcyx;* the *Bucerotidae* have a species, ranging from the Moluccas to the eastern bounds of Papuasia, whose nearest ally is found in Java, Borneo, Sumatra and the Asiatic countries to the west; while the two species of Celebes show affinity to the Philippine species. On the other hand the Hornbills, like the Coucals, lend very interesting proof to Wallace's view of the recent simultaneous separation of Borneo, Sumatra and Malacca — not Java, Sumatra and Malacca, as might have been expected from the proximity of these islands. (See map VII). In view of the fact that three genera are peculiar to this section of the East Indies, one to Celebes, one to Palawan, two to the other Philippines, and that most species of the East Indies have a very restricted range, it is puzzling to find that *Rhytidoceros* is represented by one species only in all the islands between Halmahera and the Solomons, and is continued in a closely allied species, *R. subruficollis* from Borneo to the Indo-Chinese countries; in other words *Rhytidoceros* has only become differentiated into two species between British Burmah and the confines of Papuasia, while other *Bucerotidae* have become changed into eleven genera and 26 species in half the distance.

An easy way of getting over this difficulty — and, as it would appear, most probably the true way — is on the supposition that, while *Rhytidoceros* has extended its range by flight, most of the other East Indian Hornbills have become located in their several habitats by terrestrial changes, resulting in the production of barriers of sea over which the birds do not venture to fly. On examining the wings of the Hornbills a very curious structure of the primary quills is seen in most species. The first and second are very much attenuated and so weak that they are obviously of no use in flight: it would be of interest to know, indeed, whether they are freely extended in flight, or concealed under the larger quills. All the genera of the East Indian Hornbills are represented in the Dresden Museum, and we find that this modification of the quills is most pronounced in *Anthracoceros*, though nearly as well seen in *Penelopides* and *Rhabdotorrhinus;* it is also found to a greater or less extent in *Buceros*, *Dichoceros*, *Hydrocorax*, *Gymnolaemus*, *Cranorrhinus*, *Rhinoplax*. It is not seen in *Anorrhinus* and *Berenicornis*; but in these two genera the wing is shorter and blunter than in most others, and does not appear adapted for sustained flight; Davison observed that the flight of *Berenicornis* — a contrast to other Hornbills — is noiseless (Str. F. VI, 104). With these two exceptions, the first primary has all the appearance that it is gradually dwindling away; it is probably an effect of disuse, combined with wear and tear of some kind[1]). In *Rhytidoceros plicatus* and *undulatus* the first primary is strong and not noticeably attenuated and may be of some service in flight; in *R. subruficollis* it is attenuated about as much as

[1]) As we believe caused by attrition, due to the position of the outermost remex underneath the adjacent remiges in the wing of these clumsy fliers.

in *Cranorrhinus cassidix*. On the whole the wings suggest that *Rhytidoceros* is more given to flying than the other genera. The following actual observations on the flight of the *Bucerotidae* tend to prove this. Prof. Newton in his "Dictionary of Birds" (1893, 435) states that Tickell in his manuscript "Birds of India" (in the library of the Zoological Society of London) "divides the Hornbills of that country into two genera only, *Buceros* and *Aceros*, remarking that the birds of the former fly by alternately flapping their wings and sailing, while those of the latter fly by regular flapping only". *Anthracoceros coronatus* may be taken as typical of the former class, as is shown by Legge's corresponding observation: "when flying it proceeds with rather quick-flapping of the wings, and then sails along with them outstretched, its long tail and motionless primaries giving it a singular aspect . . . It usually does not take long flights; when it does the momentum of its huge bill and heavy neck are such as to cause it on alighting to topple forward before gaining its equilibrium" (B. Ceylon, 1880, 274). Davison observed the same mode of flight in *Dichoceros bicornis* (Str. F. VI, 99), so, also, Bourdillon in the same species (Str. F. IV, 387), in *Anthracoceros convexus*, here called *Hydrocissa albirostris* (t. c. p. 101), and in *Ptilolaemus tickelli* (p. 104). *Berenicornis* flaps regularly, but "keeps in small parties about the lower trees and undergrowth" (p. 106).

As to *Rhinoplax vigil*, Hartert (J. f. O. 1889, 367, 368) remarks that it is "a bad flier, even worse than *Buceros rhinoceros*". On *Cranorrhinus corrugatus* in E. Sumatra Dr. Hagen (T. Ned. Aardrijk. Genootschap 1890, (2) VII, 139) has published the following observations: it has "like all Hornbills a heavy clumsy flight, accompanied by a peculiar ringing whizzing noise. After about each kilometer of the way (they flew daily from the sea-side to their roosting-trees inland) they rested for some minutes on suitable tall tree-tops. The resting-places are fixed points, and, if they are not scared, the birds may be expected with tolerable certainty every evening at the appointed time". It is thus seen that at least seven of the eleven genera of the *Bucerotidae* of the Indian countries and Great Sunda Islands have poor powers of flight: *Anthracoceros*, *Buceros*, *Dichoceros*, *Ptilolaemus*, *Berenicornis*, *Rhinoplax*, *Cranorrhinus*.

The flight of the wide-spread *Rhytidoceros* appears to be in marked contrast to these.

Davison writes of *Rhytidoceros subruficollis* and *undulatus*: these species "are remarkably strong on the wing, and morning and evening, where they occur, numbers may be seen flying far overhead, sometimes at such a height that they look not bigger than Crows. The strokes of their wings are accompanied by a peculiar metallic or resonant swish[1]) which can be heard at an incredible distance. One is often made aware of these birds flying far overhead by the

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[1]) Bernstein (J. f. O. 1861, 114) tries to explain the noisy flight by the movement of the air in the large air sacks, an explanation which appears to us very far-fetched; neither does Mr. O. Grant's explanation (C. B. XVII, 347 note) appear satisfactory. In our opinion the sound need not be explained in any other way than the noise caused by the flapping of the wing of many other large birds.

sound of their wings, and on looking up, the birds are seen at such an immense height as to be only just distinguishable" (Str. F. VI, 113).

Our artist, Bruno Geisler, has furnished us with the following valuable notes on *Rhytidoceros*: "During my five-years' travelling and collecting in Ceylon, Java, and German New Guinea I had the opportunity almost daily of observing the flight of Hornbills, especially of *Rhytidoceros* in the last country. Although the bird is not common, its presence is perceived at long distances by its noisy flight. With powerful strokes they pass over the virgin-forest in the morning, usually in pairs, to certain fruit-trees, causing thereby a resounding noise which may be compared to the cutting of half-rotten wood with a big saw. On my frequent boat-trips to the Huon Gulf (New Guinea), when sailing not far from the coast, I was able to watch with ease the extended flight of this bird. Often there were a pair, more rarely a larger number (which then always flew in single file at intervals of about 3 m) flying onward at a height of 100—200 m above the forest, and in spite of the great distance the beating of their wings could still be heard. In like manner, when on the mountains, enjoying the splendid view of the flat coast-land, I have seen the birds flying over wide stretches until they vanished in the distance from my keen sight. On several occasions I had the opportunity of watching the birds come over the fore-lying hills, and then, describing a great bow from a height of about 500 m, they settled upon the trees on the coast. In settling they swoop downwards on outstretched wings with a loud whizzing noise towards the bough in view, always, however, just before reaching it, they make a curve rising up to their seat, when the male often gives utterance to a loud 'go go — gagaga' — as if of satisfaction. In the silent virgin-forest the noise of their flight brings to mind a locomotive-engine in quick motion. That the flight, although it cannot be called laborious, nevertheless taxes the birds' energies very much, may be seen from the circumstance that after a long flight the bird always settles with open bill and perceptibly out of breath.

After the breeding-season an interesting spectacle is afforded by the assembly on the common roosting-tree. After sundown all that have been scattered in the neighbourhood come singly, in pairs, or in groups, some approaching from a height, some bustling out of the thick forest to the tall, free-standing tree. Received with all sorts of ejaculations by those already arrived, the suitable sleeping-places are sought for amid frequent quarrels; and, especially on moonlight nights, the company rarely ceases its somewhat noisy conversation."

From the observations of Davison and Geisler the flight of *Rhytidoceros* appears to be so superior to that of the other Hornbills in the East Indies that the wonder is — not that *Rhytidoceros* ranges from N.W. India to the Solomon Islands without presenting new forms at every zoo-geographical step like other Hornbills, but that the ranges of its species are not even wider than is the case. At all events there is good reason to believe that the anomalous distribu-

tion of this Hornbill is a consequence of its fine flying-powers and habit of flying at great heights.

The habits of the Celebesian *Cranorrhinus*, which is rather nearly allied to *Rhytidoceros*, are thus described by Meyer *(5)*: "As one looks down on a forest from a high point, it appears to swim over the green foliage more majestically than any other bird of Celebes. Its flight is heavy, slow, and noisy, and audible from far away. Its cry is very lond, and not immediately to be distinguished from that of the Black Ape of Celebes[1]). They are often seen in pairs together. If the female is shot, the male returns to the spot after having flown away frightened by the shot; and therefore frequently male and female can be procured. On a tree they are very active, jumping from branch to branch; they are fond of fighting and are generally aggressive birds". Rosenberg *(a 14)* once obtained a female owing to this propensity, it being knocked down stunned by another of its sex. "They feed on forest fruits". Layard observed that *Anthracoceros coronatus*, in order to obtain its food when attached to a branch, "resorts to an odd expedient — the coveted morsel is seized in its powerful bill, and the bird throws itself from its perch, twisting and flapping its wings until the fruit is detached; on this the wings are extended, the descent arrested, and the bird regains its footing". A tame specimen had the parrot-like habit of using its bill in regaining its perch (Legge, B. Ceylon 274). In many Hornbills, especially in old examples, the cutting edges of the bill do not meet for a considerable space between the tip and the basal part.

The head of nearly all *Bucerotidae* plays ethnographically a great role throughout the East Indian Archipelago, as Mr. Pleyte has recently shown (Rev. d'Ethn. 1885, 313 and 1886, 464). Wilken (Med. Ned. Zend. gen. 1863, 133) remarked on the present species in the Minahassa, that a head-hunter, who has the intention of carrying out his dreadful work, fixes on his head half the head of a *Buceros*, and, after having been successful, he jauntily sticks an entire head of *Buceros* on his crown for every human head obtained in his expedition (cf. also Meyer's notes in "Negritos" vol. IX Publ. Ethn. Mus. Dresden 1893, p. 9). The same author tells us that the Macassars and Bugis bury the head of this bird unter the chief pole of a new house (Bijdr. taal, land en volkenk. Ned. Ind. 1889, 110).

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[1]) Bernstein (J. f. O. 1861, 115) says of the Java species that it roars like a wild beast.

ORDER CORACIAE.

There is little agreement among systematists as to the value of the Bee-eaters, Kingfishers, Rollers, Goatsuckers, and Swifts, as orders or families of the Avian System. We prefer to take the three first groups as families of the *Coraciae*, placing the Goatsuckers and Swifts in a different order, the *Macrochires*, though it is possible that the Rollers (for instance, *Eurystomus*) may have certain affinities with the latter. In the *Coraciae* the bill is strong, often very large or long, the palate desmognathous, the wing short to moderately long; in the *Macrochires* the bill is generally very small, soft, and weak, the gape very deep and wide, the palate aegithognathous, or schizognathous, the wing very long.

FAMILY MEROPIDAE.

In the Bee-eaters the bill is long, thin, sharp, and slightly decurved; the foot has three toes in front and one behind, the tarsus is short, not longer than the hind toe and claw; the tail of moderate length, square, or forked, or with the two middle rectrices prolonged and with the projecting ends attenuated; the secondaries and inner primaries with a heart-shaped tip. The colours are very bright, green being most prevalent, also blue, black, yellow, red, and mixed hues occur. The birds breed in holes in the ground, laying white eggs; their food, consisting of *Hymenoptera* and other insects, is, we believe, generally, if not always, captured on the wing. The family is found in the temperate and tropical parts of the Old World.

For anatomical particulars: see Beddard in Dresser's "Monograph of the Meropidae", Introduction; and Sharpe, Cat. B. XVII 1892, 41, etc.

GENUS MEROPS L.

The typical Bee-eaters have the two middle tail-feathers of the adult lengthened and terminally attenuated, the wing is moderately long and pointed, the first primary very minute, the second the longest. Their powers of flight are great. Green, or yellow-green, is the most characteristic colour, except in two or three African species in which carmine-red predominates. Seventeen species, with a range nearly over the whole of the Old World, are admitted in the Catalogue of Birds, vol. XVII.

† 77. MEROPS ORNATUS Lath.

Australian Bee-Eater.

Plate VIII.

Merops ornatus *(1)* Lath., Ind. Orn. Suppl. 1801, p. XXXV; *(II)* Gld., B. Austr. 1840, II, pl. 16; *(3)* Jukes, Voy. "Fly" 1847, 157; *(IV)* Reichb., Hb. sp. Orn. Meropinae 1852, 68, t. 446, f. 2233—34; *(5)* Wall., P. Z. S. 1862, 335, 338; *(6)* Schl., Mus. P.-B. Merops 1863, 4; *(7)* Gld., HB. B. Austr. 1865, I, 117; *(8)* Brügg., Abh. Ver. Bremen 1876, V, 49; *(9)* Macleay, Pr. L. Soc. N. S. W. 1876, I, 37; *(10)* Sharpe, J. Linn. Soc. Zool. 1879, XIV, 686; *(11)* Meyer, Ibis 1879, 57, 145; *(12)* Salvad., Orn. Pap. 1880, I, 401; Agg. 1889, 52; Appendice 1891, 222; *(13)* Meyer, Verh. z.-b. Ges. Wien 1881, 763, 769; *(14)* W. Blas., J. f. O. 1883, 135; *(15)* Meyer, Isis, Dresden 1884, 6, 19; *(16)* Sharpe, Report Voy. "Alert" 1884, 21; *(16bis)* Pleske, Bull. Ac. Petersb. 1884, 117; *(XVII)* Dresser, Monogr. Merop. 1884—86, 51, pl. XIV; *(18)* Guillem., P. Z. S. 1885, 503, 546, 566; *(19)* Rams., Pr. L. Soc. N. S. W. 1886, 1097; *(20)* id., ib. 1887, 166; *(21)* North, t. c. 441; *(22)* Rams., Tab. List 1888, 3; *(23)* Cox & Hamil., ib. 1889, 401; *(24)* North, t. c. 1024; *(25)* id., Nests & Eggs Austr. B. 1889, 34; *(26)* Meyer, Ibis 1890, 413; *(27)* Büttik., Notes Leyd. Mus. 1891, 210; *(28)* Sharpe, Cat. B. XVII, 1892, 74; *(29)* Meyer, Abh. Mus. Dresd. 1893, Nr. 3, p. 11; *(30)* Newton, Dict. B. 1893, 30; *(31)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 7; *(32)* iid., ib. 1896, Nr. 2, p. 11; *(33)* Hartert, Nov. Zool. 1896, 570, 586, 595; *(34)* id., ib. 1897, p. 164.

a. **Guêpier Thouin ou à longs brins** *(I)* Levaill., Hist. Nat. Guêpiers 1807, 26, pl. 4.

"Kerikeri", near Manado (Nat. Coll. in Mus. Dresd.).

"Tomonsi bowula", Peling Id. (iid.).

"Tumpiliwarata", Karkellang, Talaut (iid.).

For further synonymy and references cf. Salvadori *12*; Dresser *XVII*; Sharpe *28*.

Figures and descriptions. Gould *II*; Dresser *XVII*; Levaillant *a I*; Reichb. *IV*; Wallace *5*; Salvadori *12*; Meyer *15*; North *21* (egg), *25* (egg); Sharpe *28*.

Adult. Head above, neck, mantle, and upper wing-coverts yellow-green, passing into yellow-chestnut on occiput and nape; and becoming blue-green on the scapulary region; lower back and rump turquoise-blue; darker on upper tail-coverts; wings rufous hazel, outer webs of the primaries green, the primaries and secondaries broadly tipped with black, tertiaries green, washed with blue; tail black, washed with green and blue on the exposed webs, the shafts of the two middle feathers produced much beyond the others, with extremely narrow webs which widen slightly at the tip into a sort of spatule; lores, suborbital region and ear-coverts black; below this a malar stripe of turquoise-blue; chin ochre-yellow, more chestnut on upper throat; across lower throat a broad black band; breast and sides yellow-green, passing into light blue on the under tail-coverts; under wing-coverts and most of under side of quills pale rufous, becoming more dusky towards the ends of quills (ad. Tabukan, Gt. Sangi: Meyer — C 2441).

Sexes. Alike in coloration *(28)*.

Young. Differs from the adult in wanting the black band across the throat, in having the general plumage grey-green varied with tips of pale blue, instead of yellow-green, and in having the middle tail-feathers without lengthened spatules; bill shorter (Manado tua, Apr. 93, C 12206; Mantehage, Apr. 93, C 12207; Nat. Coll.).

Observation. A specimen in the Dresden Museum (Nr. 6870) "Moluccas" without a black patch on the throat has, nevertheless, very long spatules 40—50 mm. Another, in which the black throat-bar is very imperfectly formed (C 1855 — Sangi), has spatules of 45 mm length. In others, which are in adult plumage, the spatules vary much in length (C 2213 — Manado = 16 mm; C 2215 — Manado = 33 mm). Specimens with the crown varied with pale blue-tipped feathers amongst the green ones, have spatules of all lengths (in C 12203 — Mantehage = 8 mm; C 2220 — Togian ♀ 1 spat. = 13 mm, the other 25 mm; C 2030 — Manado = 20 mm; C 2218 — Manado = 19 and 21 mm; C 2221 — Manado = 27 mm; C 2212 — Manado = 41 mm; C 1855 — Sangi = 45 and 47 mm; C 2224 — Manado = 72 mm). In several of these cases the two middle rectrices have not attained their full growth, and the spatules rest upon the other rectrices, not reaching to their tip.

It may be seen that the blue feathers in the crown of specimens 2224 (spatule 72 mm), 1855 (spatule 45 mm), 2212 (spatule 41 mm), and others are worn and old, whereas the yellow-green feathers are fresh and perfect, showing that the birds are assuming a green crown. It might be inferred that these are all immature specimens in process of assuming the adult dress, and that the length of the spatules varies greatly in different individuals. After full consideration we find that this view must be rejected; specimens 1855 and 2224 are among those with the very longest bills in a large series, being about 5 mm longer than in young specimens, and it is inconceivable that such a bird as 2224, with one old spatule 72 mm long and a new one sprouting, can be a young bird. The primaries — such as are remaining — are old and very much worn, as if the bird had been engaged in incubation in its nesting-hole in the sand; we take it for a very old female and infer that in the breeding season the crown and under-parts in this sex are strongly washed with blue, much as in the young. Unfortunately, no positive observations on this subject have been, so far as we are aware, yet made.

Measurements. Wing 106—116 mm (Manado, ad. C 2211; Sangi, ad. C 2441 and others); tail, without spatule, 78 mm ca.; bill 26 (juv.)—31 (ad.).

Eggs. 4 or 5 (Gld. 7). Beautiful pearly white; circa 21.6 × 18.3 mm (Australia — North *25*); "23 × 20: The eggs of all *Meropidae* are spherical, very glossy and white, when not dirtied by rotting matter in the nest, in which case they often appear clay-yellow, like the eggs of the *Podicipedidae*" (Nehrkorn MS.).

Nest. "The eggs are deposited and the young reared in holes made in the sandy banks of rivers or any similar situation in the forest favourable for the purpose. The entrance is scarcely larger than a mouse-hole, and is continued for a yard in depth, at the end of which is an excavation of sufficient size for the reception of the four or five beautiful pinky-white eggs" (Australia — Gould *II*, 7).

Breeding season. In New South Wales October, November, December (North *25*).

Distribution. Throughout Australia as far as known; New Guinea; New Britain; west to Talaut and Sangi; Celebes and Lombok[1]).

For exact localities cf. Salvadori *12*, adding Karkellang, Talaut (Nat. Coll. in Dresd. and Tring Mus.); Great Sangi (Fischer *8*, Meyer *15*); Siao (Nat. Coll.); Peling (iid.); Samao (f. Büttikofer *27*).

Observation. Dr. Sharpe omits Java — as it appears to us with good reason. Borneo is included in its range by Mr. Dresser; but Mr. Everett omits it from his list of Bornean Birds (J. Str. Br. R. As. Soc. 1889).

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[1]) As to specimens from Timor, Lombok etc. see below.

Although there is reason to believe that some few individuals of this Bee-eater remain throughout the year in some or, perhaps, all of the East India Islands in which it occurs, it is in the main a migratory bird, visiting Australia in September, breeding there, and returning northward again in February. Dr. E. P. Ramsay *(19)* speaks of it as more nearly approaching truly migratory species than any other Australian bird, and, though we believe that field observers will still have a great deal to tell on the subject of migration, it is certain no form illustrates the phenomenon of coming and going with the seasons in this region so strikingly as the present conspicuous bird. Gould terms it strictly migratory, arriving in New South Wales in August and departing northward in March *(11)*. In the Mudgee District, N. S. W., Cox & Hamilton write *(23)* that it arrives by September 25th or later, commences to nest at once, and eggs may be taken from November till the end of December; it leaves in February, a few remaining till March. When the "Fly" was in the Torres Straits, Jukes was able to observe the passage of the bird on its journey from Australia to New Guinea, and also its return-journey: "While we were in this neighbourhood (near Mount Egmont Island in Torres Straits) about the end of February, great flocks of the Bee-eater which is common in Australia *(Merops ornatus)* were continually passing to the northward. The white pigeons, also ['*Carpophaga luctuosa*' = *bicolor* or *spilorrhoa*], were going in the same direction in numerous small flocks . . . The Bee-eaters go as far to the southward as Sydney during the summer of New South Wales, but we never saw the white pigeons much to the southward of Torres Strait. In September, 1844, they were coming thickly from the northward to Endeavour Strait, and they seem to return in March" *(3)*.

Macleay *(9)* had a similar opportunity during the cruise of the "Chevert" in 1875 of watching the flight of *M. ornatus* across the Torres Straits: "It seems to commence its annual migration southwards as early as August. Throughout the early part of September, I observed, or heard, scattered flocks of from twelve to twenty of them passing the ship at all hours of the day and night, and making direct for the mainland near Cape York. They flew low, and with anything but a steady flight. I imagine their migration is a very slow and painful affair, for it is generally the month of November before they reach their breeding grounds on the Murrumbidgee".

Not all individuals make this transit to Australia, however. In German New Guinea our artist, Bruno Geisler observed *(29)* that individuals are always to be found, but, at the beginning of the year only, flocks of 20 to 30 occur. Sharpe *(10)* records Lawes' discovery of its nesting in South-east New Guinea, where, as in Australia, it lays its eggs in sand; and Mr. North *(21)* describes some eggs procured by Parkinson in New Britain, remarking that they are like Australian ones, but smaller. Dr. Ramsay *(XVII)* has also remarked that "specimens from Port Denison (N. E. Queensland) are somewhat smaller

than those from New South Wales"; nevertheless North's subsequently recorded measurements of Australian specimens *(25)* do not bear out his former statement: New Britain 21.6 >< 19.5 mm, a set from Buldery (N. S. W.) average ca. 21.6 >< 18.3 mm. Count Salvadori *(12)* was led by North's remarks doubtfully to refer the New Britain birds to *Merops salvadorii* Meyer, a species, whose validity is still to be proved.

Turning to Celebes and the Moluccas, it appears that this Bee-eater occurs here almost but not quite, entirely in the months when it is absent in Australia — that is, in the Australian winter. Meyer *(11)* writes: "*M. ornatus* Lath. is only numerous during the east monsoon (April—October). Near Manado in May, on the Togian Islands in August". Fischer *(16bis)* says: "this Bee-eater does not occur as a stationary bird, but appears in Ternate in the months March, April and May". Nevertheless Count Salvadori *(12)* was able to record two specimens killed in Halmahera in December, though the remaining 62 of his series from New Guinea and the Moluccas are dated from March to September. It would thus appear that a few remain behind in the islands throughout the year; whether they breed there or not is not known.

Notwithstanding that this species is such a thorough migrant it appears very possible that it is undergoing differentiation into an eastern and a western race. Mr. Dresser has the following remarks on its variations: "Specimens which I have examined vary somewhat in intensity of coloration and especially as regards the amount of blue in the plumage. A specimen in the Tweeddale Collection from Port Albany has the crown, scapulars, and back slightly tinged with turquoise-blue; and one in the British Museum, a female from Dorey, has the abdomen washed with blue and is labelled *Merops caerulescens*. [See our remarks, *antea*, on the probable breeding plumage of the female.] Another example in the British Museum, a female from Lombock, is peculiar in having a tolerably broad band of blue below the black pectoral band . . . I can endorse Mr. Wallace's remarks [*5*] that specimens from the Sula Islands agree with those from Ternate in having more brown on the head and less blue on the breast than the Timor and Lombock specimens". Meyer *(15)* has since separated specimens from Sumba as a subspecies, *M. ornatus sumbaensis*. Two, apparently second-year birds, have more blue on the throat below the black cross-band than any of over 60 other specimens in the Dresden Museum from Celebes, Sangi, the Moluccas and New Guinea; in two others the amount of blue is inconsiderable. Hartert *(33)* enumerates specimens from Sumbawa, Sumba, and Lombock, some with and some without blue on the throat. This character consequently seems not to be of a positive nature. There can be little doubt that the Sumba birds correspond with those from Timor and Lombok, whose differences struck Mr. Wallace. It would be of much interest to know whether specimens from West Australia have more blue below the black collar than those of New South Wales, or other differences, for if *M. ornatus sumbaensis*

be a valid subspecies, there is strong reason to suppose that it will be found to make its way to Australia by a different route from that of the great body which crosses Torres Straits in September and February. We suspect that all the birds of the Lesser Sunda Islands — Bali to Timor — may be identified with *M. ornatus sumbaensis* and that they make their way in due season by way of Timor and Rotti to N.W. Australia across the Timor Sea, which is not without a few small islands and reefs to serve as resting places.

As in *Prioniturus*, the bare shafts of the lengthened middle tail-feathers of adults are not the result of the wear and tear undergone by these feathers between the yearly or half-yearly moult of the species. But it is obvious that the webs of the feathers, and, especially, of the two long central tail-feathers, must get damaged and worn down considerably in a bird which burrows a sort of mouse-hole a yard deep in sand; the tail-feathers in particular will be rubbed and bent about, when the bird turns round in its nesting cavity at the end of its hole. In two or three specimens before us (C 2224, Nr. 13590, C 12205), the spatules seem to have suffered from this cause. In adult specimens, however, the spatules grow out of the shaft perfectly formed; the above mentioned specimen, C 2224, with one old spatule of 72 mm is getting a new one, the bare shaft of which is 30 mm long, while about 10 mm more of bare shaft at the base is still enclosed in the sheath out of which it is growing (see Plate VIII). In birds of the year the tail is square and simple, and it appears that in young specimens of the second year, as in *Prioniturus*, the middle tail-feathers are not greatly longer than the lateral ones, and the projecting part is usually not bare of web, but simply much narrowed and hollowed out a little behind the tip. Those with very long bare spatules are without doubt older birds. The case of the Bee-eaters, like that of *Prioniturus*, where we have discussed the matter more fully, appears to be a remarkable illustration of the inheritance of mutilations, an effect of wear and tear, continually repeated throughout countless generations, being ultimately reproduced in the offspring, the successive ontogenetic changes in which betray the gradual result wrought by the attrition of the sand on its more remote, and less remote, ancestors[1]).

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[1]) It is very possible that the peculiar heart-shaped double tips of the secondaries and of all the primaries (except the longest) owe their formation to the same cause. Has *Merops* the habit of supporting itself on its opened wings when it clings to the steep sand-bank in which it commences to dig its nest? Mr. Bruno Geisler, who observed *Merops* breeding in a river-bank in Java informs us that this is the case. House and Sand Martins also do so and it is of special interest to observe that the same curious quill-formation obtains in them as well. If our supposition is correct, the pressure on the feathers and the oscillation of the body of the pecking bird will force the ends of the webs apart from the shaft on one or both sides of it, forming a little notch, just as is seen if the tip of a perfect quill be tapped gently with the finger or rubbed on blotting paper or other rough substance. It is important to observe that the double-tips of the quills in *Merops* and other birds are arranged in what Mr. Keeler would term "Successional Taxology": — in the inner secondaries the outer web of the feathers has the shorter tip, in the middle of the wing the tips are about equal, in the outer secondaries and primaries the inner web has the shorter tip; in other words, where one tip is more exposed to friction than the other, it is shorter; where they are equally exposed, they are equal. Moreover, in the middle of the wing the secondaries have a very square appearance, as if they had been truncated by some means. We conceive that the wings of *Merops* are much less

The present species, like *M. apiaster* of Europe, deserves its name of Bee-eater. Gould remarks that its food consists of various insects, chiefly *Coleoptera* and *Neuroptera*; Cox & Hamilton observed that it is very destructive to bees. The same writers mention that it will plunge into water for a bath.

78. MEROPS PHILIPPINUS L.

Blue-tailed Bee-eater.

Plate VIII.

a. **Le Grand Guêpier des Philippines** *(I)* Briss., Orn. 1760, IV, 560, pl. 43; *(II)* Daubent., Pl. Enl. VI, pl. 57.

Merops philippinus *(1)* L., S. N. 1767, f. Wald.; *(2)* Blyth, J. A. S. 1846, 369; *(III)* Gld., B. As. 1855, I, pl. 36; *(4)* Schl., Mus. P.-B. Merops 1863, 2; *(5)* Beavan, Ibis 1867, 318; *(6)* Wald., Tr. Z. S. 1872, VIII, 42; *(7)* Meyer, J. f. O. 1873, 405; *(8)* Finsch & Conrad, Verh. z.-b. Ges. Wien 1873, 2, 8 (sep. copy); *(9)* Salvad., Cat. Ucc. Borneo 1874, 89; *(10)* David & Oust., Ois. Chine 1877, 72; *(11)* Hume, S. F. V, 1877, 18; *(12)* Hume & Davis., ib. VI, 1878, 67, 498; *(13)* Ball, ib. VII, 1878, 203; *(14)* Cripps, t. c. 258; *(15)* Tweedd., P. Z. S. 1878, 107, 282, 340, 709; *(16)* Meyer, Ibis 1879, 57; *(17)* Legge, B. Ceylon 1880, 306; *(18)* Vidal, Str. F. IX, 1880, 49; *(19)* Bingh., t. c. 152; *(20)* Butler, t. c. 381; *(21)* Nicholson, Ibis 1881, 143; *(22)* Kelham, t. c. 378; *(23)* Reid, Str. F. X, 1881, 21; *(24)* Davis., t. c. 1883, 350; *(25)* A. Müll., J. f. O. 1882, 396; *(26)* Oates, B. Brit. Burmah 1883, II, 66; *(27)* W. Blas., J. f. O. 1883, 135; *(28)* Vorderman, Ned. Tdschr. Ned. Ind. 1883, 47; *(XXIX)* Dresser, Monogr. Merop. 1884, pp. XVII, 55, pl. XV; *(30)* A. Müll., J. f. O. 1885, 155; *(31)* Guillem.. P. Z. S. 1885, 503; *(32)* Hume, Str. F. XI, 1888, 42; *(33)* Hartert, J. f. O. 1889, 364; *(34)* Everett, J. Str. Br. R. A. S. 1889, 164; *(34bis)* Tristr., Cat. Coll. B. 1889, 97; *(35)* Steere, List B. and Mamm. Philipp. 1890, 9; *(36)* Oates, Hume's Nests and Eggs 1890, III, 63; *(37)* Hartert, J. f. O. 1891, 296; *(37bis)* Salvad., Ann. Mus. Civ. Gen. 1891, 47; *(38)* Sharpe, Cat. B. XVII, 1892, 71; *(XXXIX)* Meyer, Vogelskel. pt. XVII, 1892, pl. CLXII; *(40)* Maun, Ibis 1894, 60; *(41)* Büttik., Z. Erg. Weber's Reise Ost-Ind. 1893, III, 274; *(42)* Oust., Nouv. Arch. du Mus. 1893, 138; *(43)* Steere, Ibis 1894, 417; *(44)* Bourns & Worces., B. Menage Exped. 1894, 34; *(45)* Vorderm., N. T. Ned. Ind. 1895, LIV, 333; *(46)* Clarke, Ibis 1895, 474; *(47)* Blanford, Faun. Br. Ind., B. III, 1895, 111; *(48)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 1, p. 8; *(49)* Sharpe, Br. B. 1896, II, 57; *(50)* Jesse, Ibis 1896, 190, 195; *(51)* Hart., Nov. Zool. 1896, 550, 595.

b. **Le Guêpier à queue d'azur ou le Guêpier Daudin** *(I)* Levaill., N. Hist. Guêpiers 1807, 49, pl. 14.

c. **Merops javanicus** *(1)* Horsf., Tr. L. S. 1821, XIII, 171.

d. **Merops daudeni** *(1)* Cuvier; *(2)* Hume, Str. F. II, 1874, 162; *(3)* id., III, 1875, 49.

e. **Merops philippinus** var. **celebensis** *(1)* W. Blas., Ztschr. ges. Orn. 1885, II, 239; 1886, 88,

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violently used than is the tail of the Woodpecker, for the rectrices of the latter have the webs tapering off to whalebone-like spines, which are used as a powerful prop to the bird during its pecking and excavating work. At the same time it should be pointed out that a somewhat similar form of quills occurs in some other birds, such as *Carduelis*, where a corresponding cause for their formation cannot, perhaps, be supposed.

"**Burong langir**" (bird of high flight), Minahassa (Meyer *16*).
"**Tguru**", Macassar and Tjamba (Platen *e 1*).

For further synonymy and references see Dresser *XXIX*; Sharpe *38*.

Figures and descriptions. Daubenton *a II*; Levaillant *b I*; Gould *III*; Dresser *XXIX*; Meyer *XXXIX* (skeleton); Legge *17*; Oates *26*; W. Blasius *e 1*; Sharpe *38*; Blanford *47*.

Adult. Above olive-green, scapulars washed with greyish blue; quills — double-tipped — green, broadly tipped with blackish (except the innermost ones) washed with greyish blue on terminal part; rump and upper tail-coverts glaucous blue; tail duller greenish blue, the two middle rectrices much longer than the others, the projecting part much narrowed, but never bare of web, extreme ends slightly widened; above eyes and on forehead at base of bill a streak of turquoise-blue; a submalar streak of the same colour; between them incl. lores, subocular region and ear-coverts black; chin ochre-yellow; throat rufous hazel; upper breast yellowish green, becoming buffy olive-grey on the sides and abdomen; under tail-coverts very pale greyish blue; under wing-coverts and quills towards their bases rufous (♀ Macassar, Platen. 25. I. 78, — C 5367). "Iris blood-red; bill and feet black."

Sexes. Alike (Sharpe *38*, Legge *17*).

Young. The two middle tail-feathers very little longer than the others; all the feathers of the green parts of the upper surface narrowly margined with greyish or bluish; the reddish on the throat much less pronounced; the blue supraloral and malar streaks wanting (Macassar, Oct. 1871, Meyer, C 2261). "Iris dull red, or brownish red" (Legge).

Measurements.

	Wing	Tail without spat.	Bill from nostril
a. (C 5367) ♀ ad. Macassar	130	95	—
b. (C 3511) imm. N. Celebes	128	98	32
c. (C 2263) ♂ imm. Limbotto, N. Cel.	125	99	31
d. (C 3512) imm. N. Celebes	123	95	30
e. (C 3512) imm. Manado	128	90	—
f. (C 2261) ♂ juv. Macassar	125	95	27
g. (Schlüter) ♂ imm. S. Celebes	130	96	34
h. (Schlüter) imm. S. Celebes	126	91	—
Six specimens from the Philippines	121-131	90-100	29-35.5
C 2264 ♂ ad. Singapore, Dec.	132	94	33
C 4853 imm. Calcutta	124	90	32
C 6152 ad. Kupang, Timor	133	91	36

Skeleton.

Length of cranium (fr. sin. nasofr.)	20.5 mm	Length of fibula	14.0 mm
Greatest breadth of do.	17.7 »	Length of tarso-metatarsus	10.0 »
Length of humerus	29.7 »	Length of sternum	34.0 »
Length of ulna	37.7 »	Greatest breadth of do.	17.6 »
Length of radius	35.5 »	Height of crista sterni	10.0 »
Length of manus	30.5 »	Length of pelvis	26.0 »
Length of femur	18.0 »	Greatest breadth of do.	18.0 »
Length of tibia	28.0 »		

Eggs. Usually 4 or 5 (Hume *36*). Spherical, very glossy and white. 23.5 to 24.5 by 20 mm (Nehrkorn MS.). 20.8—24.6 × 17—21.6 (Hume *36*).

Nest. "Breeds in holes in banks. The holes are rarely less than 4 feet deep, and I have known them to extend to 7 feet [often over 7 feet — Bingham *XXIX*]. In diameter they vary from 2—2½ inches" (Hume *36*).

Breeding season. On the Irrawaddy at the end of April (Oates *36*); Nerbudda River, India, by the 1st April (Nuna *36*); Mahanuddy River, India, in May (Blewitt *36*); Lahore, Punjaub. in June (Marshall *36*); Kaukarit River, Tenasserim, in April and May (Bingham *36*).

Distribution. Almost all parts of India (Dresser *XXIX*; Legge *17*); Ceylon (Legge *17*); Andaman Islands (Beavan *5*); Nicobar Islands (Blyth *2*, Davison *d 2*); Burmah (Oates *26*); Tenasserim (Bingham *19*, *XXIX*, *etc.*); South China (David *10*); Cochin China (D. & O. *10*; Pierre *38*); Malay Peninsula (Cantor *38*, Davison *38*, *etc.*); Singapore (Kelham *22*, *etc.*); Sumatra (Raffles *9*, Hartert *33*, Modigl. *37bis*); Java (Horsf. *9*, Boie *9*, H. O. Forbes *21*, Vorderman *28*, *etc.*); Bali (Doherty *51*); Lombok (Vorderman, *etc. 9*, *45*, *51*); Sumbawa (Guillem. *31*); Flores (Wall. *38*); Timor (Wall. *34bis*, *38*), Riedel in Dresden Mus.); Celebes — Macassar (Meyer 7, *16*, Conrad *8*, Platen *e 1*), Tjamba (Platen *e 1*), Pare Pare (P. & F. Sarasin *48*), Maros and Luwu (Weber *41*), Limbotto in Gorontalo Distr. (Meyer *16*), Minahassa (v. Musschenbr. & Faber in Dresden Mus.); Borneo (Schwaner, *etc. 4*, *9*, *34*); Philippine Islands (Cuming *9*, Everett *15*, *38*, Steere *etc. 35*, *43*, *44*, *46*).

In addition to these localities Mr. Nicholson *(21)* records two specimens captured at sea by Mr. H. O. Forbes in the Indian Ocean a long way east of the Maldive Islands, viz. one, on Nov. 7th, in 3° 26′ N. by 17° 48′ E. (misprint, apparently, for 77° 48′ E.); the other, on Nov. 9th, in 1° 24′ N., by 76° 43′ E.

In his excellent article on this Bee-eater, Mr. Dresser proves from ample quotations from the observations of naturalists that it is in the main a migratory species. The results arrived at may be briefly recapitulated with one or two additional observations as follows:

Oudh and Kumaon: Hot season (May—Sept.), but not in any numbers (Irby).
N. W. Provinces: Arrive November; scarce, June; all gone July, August (Bingham).
East Bengal: Arrive in February, breed in July and August, after which they disappear (Cripps).
Lower Bengal: Chiefly, or only, during the rainy season (summer), (Blyth).
Chota Nagpur: Hot season (Ball).
Central and East India: Cool season.
Calcutta district: Rainy season — June to August; never very plentiful (Munn *40*).
India, W. Coast (Virgola): numbers in January, by April not one to be seen (Bingham).
Ceylon: Arrives in September, leaves in March—April (Legge).
Pegu: Constant resident, but in the rains comparatively few (Oates). Breeds in thousands on the Irrawaddy in April—May (Jerdon).
Tenasserim: Partially migratory; appears after the rains and vanishes by the end of May following (Bingham).
South China: Summer visitor (David & Oustalet).
Singapore: Arrives in September; no mention of its occurrence except during the wet season (Kelham).
Celebes: In the Minahassa plentiful only in the dry season during the east monsoon (April—Oct.); rare in the west monsoon (Oct.—April) (Meyer).

From the Philippine Islands Lord Tweeddale *(15)*, Meyer *(16)*, Dr. Sharpe *(38)* and Dr. Steere *(35)* record dates sufficient to show that it occurs there all the year round; in all probability, however, its numbers fluctuate with the season.

This species appears to be much rarer in Celebes than *M. ornatus*. Large numbers of the latter have been sent to the Dresden Museum in two collections formed by native hunters in April—May and August—September, but not one of *M. philippinus* was among them; neither does it seem to have been obtained there by Wallace, Forsten, S. Müller, v. Rosenberg, Fischer, Everett, or Doherty. The Celebes form was separated in 1885 by W. Blasius as var. *celebensis*, on the ground that it differs in wanting a sharp boundary between the red-brown throat on the remaining underparts, and by having a darker, much more olive-brown back and head, and the blue colour of the body much less developed *(e 1)*. Four specimens from South Celebes before us (two of them already discussed l. c. by Prof. W. Blasius) bear out these conclusions; but four others from North Celebes do not, but are like ones from the Philippines and elsewhere, though the North Celebes birds before him were included under var. *celebensis* by Blasius, and an adult female from S. W. Celebes in the Sarasin Collection does not seem to differ from a specimen from Luzon. The validity of the subspecies is not found admissible by Dresser *(XXIX)* or by Sharpe *(38)*; and, in view of the migratory habits of the species as a whole, and the evidence of the specimens before us, we think it hardly possible that the differences pointed out can be of a racial description.

Birds of the year, as already remarked, have the central rectrices but little longer than the lateral ones; but, as Legge says, after arriving in Ceylon in September they quickly acquire the adult tail *(17)*. The narrowed feathers grow out of the sheath perfectly formed from the first, but in this species they never appear to attain to the same length and bareness often found in *M. ornatus*, and, as compared with that species, are in a less advanced state of development. This may have to do with the circumstance that *M. philippinus* makes a larger, though usually much deeper nesting-hole; it is described as being 2 to $2^1/_2$ in. in diameter, or as large as that of a rat, while that of *M. ornatus* is said by Gould to be like a mouse-hole. "The egg-chamber", says Major Bingham *(XXIX)* "is proportionally larger than that of the smaller species [*M. viridis*], and is, unlike theirs, sometimes lined with a little grass, a few feathers, or the wings of white ants."

Perhaps its greatest known breeding-quarters are the banks of the Irrawaddy. We do not know of any record of its nesting in the East Indies, though it occurs in the Philippines and perhaps in Celebes and elsewhere all the year round.

M. philippinus preys, according to Jerdon on wasps, bees, dragon-flies, bugs, and even on butterflies *(XXIX)*, which it captures on the wing. All observers seem to have been struck by its rapid, soaring, flight, whence its name in North Celebes, "Burong langir" — the bird which flies up very high.

The nearest ally of *M. philippinus* is perhaps *M. ornatus*, which is placed next to it both by Dresser and by Sharpe. Both are migratory and one may be broadly said to represent the other according as they occur north or south of the equator, and it is conceivable that their differentiation into two forms may have been influenced by the circumstance that the breeding seasons in India and Australia are separated by an interval of half a year.

GENUS MEROPOGON Bp.

This genus has the two middle tail-feathers prolonged and attenuated as in *Merops*, but is easily distinguished by its possessing a gorget of broad, lengthy feathers, and by a very different wing-formula: the first quill is about half the length of the longest, the second equal to the sixth, the third, fourth and fifth the longest. It is most nearly allied, apparently, to *Nyctiornis*, which has the tail square, and a curious groove along the ridge of the culmen. *Meropogon* is known only by one species from the Minahassa, North Celebes.

+ 79. MEROPOGON FORSTENI Bp.

Forsten's Bee-eater.

Meropogon forsteni *(1)* Bp., Consp. 1850, I, 164 (ex Temm. MS.); *(2)* Reichb., Hb. spec. Orn., Merops, 1851, 80; *(3)* Bp., Consp. Vol. Anisodact. 1854, 8; *(4)* Wall., Ibis 1860, 142; *(5)* id., Malay Archip. 1869, I, 429; *(6)* Wald., Tr. Z. S. 1872, VIII, 42, 111; *(VII)* Gld., B. Asia I, pl. 39 (1873); *(8)* Meyer, J. f. O. 1873, 405; *(8bis)* Hartlaub in Neumayer's Anleitung 1875, 475; id. ib. 2nd ed. 1888, 395; *(8ter)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 655; *(9)* Meyer, Ibis 1879, 58; *(X)* id., Vogelskel. pt. 1, 1879, 3, pl. V; *(11)* W. Blas., J. f. O. 1883, 135; *(XII)* Dresser, Monogr. Merop. 1884, 15, pl. IV; *(13)* Platen, Gefied. Welt 1887, 230; *(14)* Sharpe, Cat. B. XVII, 1892, 41, 87; *(15)* Meyer, Vogelskel. 1892, pt. XVII, 34; *(16)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 7; *(17)* iid., ib. 1896, Nr. 1, p. 4.

a. **Merops forsteni** *(1)* Schl., Handl. d. Dierk. 1857, 310; *(2)* id., Dierent. 1872 p. 53 fig.; *(3)* id., Mus. P.-B. Merops 1863, 8; *(4)* Finsch, Neu Guinea 1867, 160; *(5)* Meyer, J. f. O. 1871, 231; *(6)* v. Musschenbr., N. T. Ned. Ind. 1876, XXXVI, 382; *(7)* Rosenb., Malay. Archip. 1878, 272.

b. **Pogonomerops forsteni** *(1)* Cab. & Heine, Mus. Hein. 1860, II, 132, note.

c. **Nyctiornis (Meropogon) forsteni** *(1)* Gray, HL. 1869, I, 98.

d. **Nyctiornis forsteni** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 49.

Figures and descriptions. Gould *VII*; Dresser *XII*; Meyer *X*, *15* (skeleton); Schl. *a 3*; Walden *6*; Brüggemann *d 1*; Sharpe *14*.

Adult. General colour above, including wings and the two lengthened middle rectrices, parrot-green, becoming dull bluish on the narrowed projecting part of the two middle rectrices, the ends and shafts of the remiges blackish; the lateral rectrices rufous chestnut, the outer webs of the outermost ones and the outer margins of the others green; forehead, crown, cheeks, chin, throat and chest dark hyacinth-blue, the gorget-feathers much elongated, broadened, and pendant; remaining parts of head and neck dull maroon; abdomen, flanks and sides dusky, washed with green;

under tail-coverts hazel margined with green; under wing-coverts silky whitish; basal part of quills below fawn colour. (Minahassa, v. Musschenbr. Nr. 1973). ♂, "Iris brown; bill black; feet blackish grey" (Platen — fide Nehrkorn in lit.).

Sexes. Similar in coloration.

Nest. A burrow in the ground (see below).

Measurements.

	Wing	Tail (lateral rect.)	Tarsus	Bill from nostril
a. (1973) ad. Minahassa	115	107	11.5	34
b. (2208) ad. "Celebes" (Frank)	114	105	11.5	36
c. (C 13896) ♀ ad. Rurukan, 24. III. 94 (P. & F. S.)	117	108	11	36
d. (Sarasin Coll.) ♂ ad. Rurukan, 16. III. 94	117	114	—	37.5
e. (Sarasin Coll.) ♀ Rurukan, 18. III. 94	113	109	—	37.5
f. (Sarasin Coll.) ♀ ad. Rurukan, 16. IV. 95	118	110	—	38

In specimen, *b*, the tail is square, but the two middle rectrices are wanting[1]).

Skeleton.

Length of cranium	69.0 mm	Length of tibia	26.0 mm
Greatest breadth of cranium	20.5 »	Length of tarso-metatarsus	11.8 »
Length of humerus	31.8 »	Length of sternum	34.4 »
Length of ulna	39.5 »	Greatest breadth of sternum	12.5 »
Length of radius	36.7 »	Height of crista sterni	11.0 »
Length of manus	30.3 »	Length of pelvis	24.0 »
Length of femur	18.6 »	Greatest breadth of pelvis	18.7 »

Distribution. Minahassa, Celebes: Tondano (Forsten *a 3*), Rurukan (P. & F. Sarasin), near Rurukan and Langowan (Meyer *a 5*, *9*), Mt. Klabat (Platen *13*), Mt. Masarang (P. & F. S.).

This beautiful Bee-eater, one of the chief treasures of the Celebesian Ornis, was discovered in 1840, by Forsten, who obtained a single male near Tondano at an elevation of 2000 ft. Subsequently, it was sought for in vain by Wallace and von Rosenberg, and doubt was felt as to its Celebesian origin, but in 1871 it was rediscovered by Meyer in the rich virgin forest of the high country near Rurukan, and on the way from Langowan to Panghu, places in the neighbourhood of the Tondano lake. The bird appeared to be not rare, but restricted to certain localities. Since this, specimens have been sent to Europe by Fischer and van Musschenbroek; while Dr. E. Oustalet, as Mr. H. E. Dresser says, purchased several examples from a plumassier, by whom they "would have been cut up for plumes, had not Mr. Oustalet fortunately rescued them from so sad a fate" *(XII)*. Dr. Platen *(13)* describes his encounter with a troop of twenty or thirty specimens of this rare bird near a swampy pool in the virgin forest on the S. W. side of Mount Klabat; they shot past him noiselessly on motionless extended wings, to vanish quickly, and return again, when several fell to his gun. Unfortunately they were moulting. One of Platen's specimens in the Nehrkorn Museum is dated 13. I. 89; thus we know when the species moults. What is known of Forsten's Bee-eater tends to prove that it is a forest-haunting bird of sociable habits, and so far it has been recorded only

[1]) By a *lapsus calami* Dr. Sharpe states that the *Meropidae* have "ten rectrices" (Cat. B. XVII, 41). The proper number is twelve.

from a considerable altitude (2000 ft and more), where the several points of its discovery are almost within sight of one another.

The Sarasins paid much attention to this species and succeeded in discovering its breeding habits. They write (in lit. 13. July, 1895): "On 16th April we received nestlings when at Tomohon. The hunter described the nest as follows: On the earth-embankments round the small crater-lake on Mt. Masarang was a small entrance-hole, which led into a passage of over a meter long, this opened at the end into a chamber the size of a cooking-pot, filled with remains of food (ejectamenta), elytra of beetles, insects' wings, etc. He brought a great mass thereof back, of which we send you two glass cylinders full. In this mass he found 2 young ones; one must have been dead already for a long time, for it was full of maggots and yet not turned out of the nest, the other was alive and bored continually into the mass of ejectamenta, in order to hide itself. Remains of egg-shells were also in the nest. We had already often remarked that all examples of *Meropogon* had clay and dirt on the crest-feathers; this manifestly comes from its flying into holes in the ground".

As to the food of the species, shown by the ejectamenta sent by the Drs. Sarasin, Dr. Heller found: "The bulk of the insect-remains is formed of fragments of *Hymenoptera*, and indeed these consist principally of the wings, clypei, single segments of the body and the pollenigerous tarsi of a species of *Apis* (probably *indica* F.), also of the wings and clypei of a species of *Dielis* (perhaps *javanica* Lep.). Besides other *Hymenoptera*-remains, not to be determined at once, remains of beetles are tolerably abundant, for instance of *Euchlora* (a form almost as big as a Cockchafer), *Macronota sp.*, *Glycyphana regalis* Voll., and others".

Touching the generic characters and nearest affinities of *Meropogon*, Lord Walden remarks *(6)*: "this species has the first primary half the length of the second, which is a little shorter than the third. The third and fourth are longest and equal[1]). The fifth is somewhat shorter than the third and fourth but longer than the second. In the structure of the wing therefore it differs from both *Merops* and *Melittophagus*, but agrees with *Nyctiornis*[2]). The grooved culmen of *Nyctiornis* is not present; but a shallow channel extends from the base of the maxilla, on both sides of the culmen, for two-thirds of its length .... The rectrices are truncated as in *Nyctiornis*, but the middle pair are elongated, as in *Merops*, and closely resemble in form and proportion those of *M. philippinus*. The feet are those of the family. The elongated pectoral plumes resemble in character those of *Nyctiornis*. Altogether *M. forsteni* may be regarded as a link uniting *Nyctiornis* to *Merops*, but most nearly allied to *Nyctiornis*".

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[1]) It would be more correct to say the third, fourth and fifth about equal and longest, the first about half their length, the second equal to the sixth. A feather must have been missing in Walden's example.

[2]) In *Merops* the first primary is abortive, and the second and third more or less nearly equal and longest. Lord Walden remarks that the *Melittophagus*, which most nearly resembles *M. forsteni* in the graduation of the quills and the form of the rectrices, the middle pair excepted, is *M. bullockoides* Smith.

Comparing the skeleton of *Meropogon forsteni* with that of *Merops philippinus*, Meyer *(15)* points out that: in *M. forsteni* the crista sterni does not rise sharply, there is a fenestra (no incisura) intermedia, occipital protuberance less strongly expressed, processus orbitalis posterior more strongly developed, 7 ribs (in *philippinus* 6).

In the genus *Merops* the nearest known ally of *Meropogon* is probably *Merops breweri* of Gaboon, West Africa, between which species and *Nyctiornis athertoni* of India as far as Siam and Tenasserim, *M. forsteni* is placed by Dresser and by Sharpe; but we cannot agree with Mr. Wallace that *M. breweri* is the "only near ally" of *Meropogon (5)* and Mr. Wallace himself appears to have abandoned this opinion in his later work "Island Life" (1880, 430). Its nearer allies are no doubt *Nyctiornis athertoni* and *amictus*.

The geographical distribution of East Indian *Meropidae* affords an interesting case almost parallel with that of the Hornbills. East of Celebes, as has been shown, there occurs only one Hornbill, a species, ranging from the Moluccas to the Solomons, belonging to a genus of exceptionally good flying-powers, which has in all probability extended its range by flight. In Celebes and the countries to the west occur numerous genera of Hornbills with weaker wings and, consequently, poor powers or indolent habits of flight; and these genera are of narrow geographical range. Similarly, among the *Meropidae* there is found to the east of Celebes only one *Merops*, *M. ornatus*, a species belonging to a genus which, like the wide-spread Hornbill, *Rhytidoceros*, is excellently fitted, by the form of its quills and habits of flight, to making its way on the wing to new territories. Many species of *Merops* are migrants, and *M. ornatus* makes its way annually from Celebes eastward to Australia. It cannot, therefore, be doubted that this species extended its range by flight; it is indeed conceivable, as has been already remarked, that some members of *M. philippinus*, visiting the East India Islands about the equator during the cold season, made their way to the south, instead of returning north, and so became gradually adapted to a different breeding season, thus cutting themselves off from all intercourse with the stock from which they sprang. *Meropogon* and *Nyctiornis* correspond with the ill-flying species of Hornbills, and, like them, extend to Celebes, but no further. Actual observations on their flight are still rather a desideratum, but their wings are much blunter and more rounded than that of that genus, and they appear to be of much quieter habits of flight than *Merops*. Thus Hodgson writes of *N. athertoni*: these birds "seek the deepest recesses of the forest, and there, tranquilly seated on a high tree, watch the casual advent of their prey, and having seized it return directly to their station. They are of dull staid manners, and never quit the deepest recesses of the forest" (Dresser, p. 9). Dr. Hagen refers to *Nyctiornis amicta* in Sumatra as a bird which "sits quiety and motionlessly on a bough above us" (T. Ned. Aard. Genoots. 1890, 2. ser., VII, 141). This should be contrasted for a moment with Dr. Jerdon's account of *M. philippinus*: "the flight of this Bee-eater is very fine and powerful, now dashing onwards with rapid

strokes, and a velocity that can beat that of a dragon-fly, having captured which, it flaps along in more measured time, now and then soaring with outspread wings"; — or with Col. Legge's: "the Blue-tailed Bee-eater congregates in large flocks on the wing, dashes to and fro for hours together, ascending to a great height in pursuit of its prey, and keeping up its not unpleasant notes without intermission" (Dresser, pp. 59, 60). Other observers write similarly. The genus *Merops* is consequently as valueless as *Rhytidoceros* for questions connected with geographical distribution; *Nyctiornis* and *Meropogon*, on the other hand, may well be species which by reason of their habits have remained quietly settled in their peculiar habitats since subsidences of land took place and the sea gradually worked its channels. Like as was seen to be the case among the ill-flying Hornbills, Borneo, Sumatra and Malacca have one species of *Nyctiornis*, viz. *N. amictus*, in common; while Celebes has its own peculiar genus, *Meropogon*, a form perhaps of equal value with the Hornbill, *Rhabdotorrhinus*. To make the sequence perfect, Java and the Philippines should also each harbour a corresponding genus; it is, of course, still possible that such will be found there.

FAMILY ALCEDINIDAE.

Perhaps the best means of distinguishing a Kingfisher (except from the Bee-eaters) is furnished by its foot, which is small and feeble with the anterior toes united for the greater part of their length, only the distal phalanx (circa) and the claw being free, the inner toe small, in one genus quite abortive, in others absent. The bill is straight, usually pointed, in a few genera having a terminal hook to the culmen, often very long, never appreciably shorter than the large head, the nostrils linear, exposed, more or less covered above with a membranous operculum, and situated in the side of the maxilla, often overreached by the frontal plumage. The wing is generally short and rounded, but sometimes of a fair length; the tail variable; the legs very short and weak. Blue is the most characteristic colour, occurring as it does — though not in all genera or species — in very pure and brilliant tints; rufous, purple, brown, black, white, and green are also frequent colours, but pure red and especially pure yellow are very rare. The smallest Kingfishers of the genus *Ceyx* are less than a Sparrow in size, the largest, *Dacelo*, as large as a Crow. The family is cosmopolitan in its distribution.

For some anatomical peculiarities see Blanford, Faun. Br. Ind. B. III, 1895, 118; Cunningham, P. Z. S. 1870, 280.

The Kingfishers prey upon fish, insects, reptiles, etc. — some genera exclusively on fish. They have the habit of watching for their prey. They nest in holes, usually in the ground, and lay white eggs.

The Celebesian area is very rich in Kingfishers, having 7 genera, two of which, *Ceycopsis* and *Cittura*, are peculiar to it.

GENUS ALCEDO L.

With four toes, the inner one about as long as the hallux; tail very short, shorter than the bill; bill long, straight, rather slender and narrow, higher than broad at base across the nostrils; wing short, the 2nd, 3rd and 4th quills longest, 1st but little shorter, secondaries about $^5/_6$ their length. Birds somewhat larger than a Sparrow, with the rump and much of the back bright blue, the head barred with blue and black.

Sharpe recognises 10 species, distributed "over the greater part of the Old World, excepting Australia and Polynesia. Absent in the New World". There are three species in Celebes, one probably a migrant.

+ 80. ALCEDO ISPIDA L.

Common Kingfisher.

Alcedo ispida Linn., *(I)* Naum., Vög. Deutschl. 1826, V, 480, pl. 144; *(II)* Gld., B. Eur. 1837, II, pl. 61; *(III)* id., B. Gr. Brit. 1870, II, pl. 10; *(IV)* Sharpe, Monogr. Alcedin. 1870, I, pl. I; *(V)* Fritzsch, Vög. Eur. 1871, pl. XIV, fig. 1; *(6)* Shelley, B. Egypt 1872, 164; *(7)* Hume, Str. F. 1873, I, 168; *(VIII)* Dresser, B. Eur. 1875, V, 113, pl. 290; *(9)* Newton's ed. Yarrell's Brit. B. 1881, II, 443; *(10)* Liebe, J. f. O. 1883, 286; *(11)* Seeb., Hist. Brit. B. 1884, II, 341; *(11bis)* Sharpe, Ibis 1886, 166; *(12)* St. John, Ibis 1889, 157; *(12bis)* Seeb., B. Japan. Emp. 1890, 175; *(13)* Sharpe, Ibis 1891, 110; *(14)* id., Cat. B. XVII, 1892, 141; *(15)* Sclat., Ibis 1892, 573; *(16)* Meyer & Helm, Jb. Orn. Beob. Sachsen VI, 1892, 85; *(17)* Seeb., Ibis 1893, 51; *(18)* Newton, Dict. B. 1893, 485; *(19)* Grant, Ibis 1894, 409; *(20)* Bourns & Worces., B. Menage Exp. 1894, 34.

a. **Alcedo bengalensis** Gm., *(1)* ? S. Müll., Reiz. Ind. Arch. 1858, II, 8; *(II)* Gld., B. Asia 1862, I, pl. 53; *(III)* Sharpe, Monogr. Alcedin. 1870, 11, pl. 2; *(4)* Swinh., P. Z. S. 1871, 347; *(5)* Salvad., Cat. Ucc. Borneo 1874, 92; *(6)* David & Oust., Ois. Chine 1877, 74; *(7)* Meyer, Ibis 1879, 64; *(8)* Legge, B. Ceylon 1880, I, 292; *(9)* Salvad., Orn. Pap. 1880, I, 407; *(10)* Meyer, Isis, Dresden 1884, 6; *(11)* Guillem., P. Z. S. 1885, 504, 547; *(12)* W. Blas., Ornis 1888, 307, 570; *(13)* Everett, J. Str. Br. R. A. S. 1889, 158; *(14)* Sharpe, Ibis 1890, 18, 283; *(15)* Whitehd., t. c. 45; *(15bis)* Oates, Hume's Nests & Eggs 1890, III, 1; *(16)* Styan, Ibis 1891, 325, 483; *(17)* Salvad., Ann. Mus. Civ. Gen. 1891, 47; *(18)* De La Touche, Ibis 1892, 479; *(19)* Hose, ib. 1893, 408; *(20)* Munn, ib. 1894, 56; *(21)* Everett, ib. 1895, 30.

b. **Alcedo ispida bengalensis** *(1)* Tacz., Faun. Orn. Sib. Orient. 1891, I, 194; *(2)* Hartert, Nov. Zool. 1894, 480; *(3)* id., ib. 1896, 550, 571; *(4)* id., ib. 1897, p. 160.

For synonyms and references see Sharpe *14*.

Figures and descriptions. Naumann *I*; Gould *II*, *III*, *a II*; Sharpe *IV*, *14*; Fritzsch *V*; Hume *7*; Dresser *VIII*; Legge *a 8*; Salvad. *a 9*.

Adult. General colour above greenish blue, greener on the mantle, each feather on head above and hind neck crossed with a subterminal bar of pale blue, wing-coverts tipped

with the same colour; a line down middle of back, rump turquoise-blue, becoming more cerulean on the upper tail-coverts; tail duller blue; malar stripe continued to shoulder, greenish blue washed with brighter blue; ear-coverts cinnamon-rufous, paler on sides of neck; chin and throat white, washed with buff, rest of under surface cinnamon-rufous, darkest on the breast (Manado, Celebes, March 1871 — Nr. 6288).

Adult female. Similar to the male, but rather duller and greener, and distinguished by having the basal half of the lower mandible red (Sharpe *14*).

Young. Similar to the adults, but much more dingy in colour, and always recognisable by the ashy colour which overspreads the fore neck and breast, all the feathers being edged with dull ashy (Sharpe *14*).

Measurements. (Nr. 6288) ad. Manado, Celebes, wing 70, tail 31, bill from nostril 32, tarsus 9 mm.

Eggs. 5 to 7; roundish oval, pure white (unblown pinkish). very smooth and glossy; 19—22 ×16.5—18.3 mm (Dresser *VIII*; Hume *a 15bis*).

Nest. Digs a hole in a bank, usually overhanging water, 2 to 3 inches in diameter, and $1^1/_2$ to $3^1/_2$ feet deep, a nest of ejected fish-bones gradually formed at the end (Dresser, etc.).

Breeding season. In Europe commences in April (Dresser *VIII*); in India, January or March to June, varying according to locality (Hume *a 15bis*), Calcutta district, July and August (Munn *20*).

Distribution. Nearly the whole of Europe as far as about 60° N.; North Africa (in part only in winter); across Northern Asia as far as the Japanese Islands, throughout China, the Burmese countries and the Indian Peninsula (Meyer & Helm *16*; Sharpe *14*); Malay Peninsula to Borneo, Java, the Philippines (Salvad. *a 9*, B. & W. *20*, Everett *19*, *a 21*); Talaut Is. — Karkellang (Nat. Coll.); Great Sangi (Hoedt, Platen *a 12*); Siao (Hoedt *a 12*); North Celebes — Manado (Meyer *a 7*), Kema (Guillemard *a 11*); Halmahera; Ternate; Timor (Salvad. *a 9*).

The Common Kingfisher has rufous ear-coverts, thus distinguishing itself from the closely allied *A. moluccana*, in which the ear-coverts are blue like the cheeks and sides of the head. In Flores, Dr. Sharpe *(14)* finds the Common Kingfisher has a little blue before and behind the eye, and separates it as a subspecies, *floresiana*. Hartert says the two forms intergrade.

In uniting in one species, *A. ispida*, the 395 specimens of this form in the British Museum from all parts of Europe, Asia and the East Indies, Dr. Sharpe *(14)* has done a stroke of work for which ornithologists, troubled to know under what name to speak of specimens from this or that locality, will be grateful. There is now perhaps too strong a tendency to regard *A. ispida* as consisting of two races, a larger and typical western, and a smaller eastern *(A. bengalensis)* subspecies; for differences probably exist between specimens from several different localities. Thus, Dr. Sharpe separates the Flores bird *(floresiana)*, Mr. Hume that of Sindh *(sindiana)*, Reichenbach that of the Sunda Islands (var. *sondiaca*), Seebohm that of Japan, China and South Siberia *(bengalensis)*. The Kingfisher is the more puzzling in not being a thorough-going migrant; in the West it is known to visit Corsica, Malta and North Africa in winter; in the East it is a summer migrant in the northern Japanese Islands, a resident in the

southern ones (Seebohm *12bis*), a resident about the Lower Yangtse (Styan *a 16*), apparently so in Ceylon *(a 8)*; but, according to Mr. Whitehead it is a winter migrant to Borneo and Palawan, arriving in Palawan on its way south about the middle of September *(a 14, a 15)*, and such we believe it will be found to be in the Sangi Islands and in Celebes, where specimens have been recorded only by Meyer (March) and Guillemard. The time is not yet ripe for splitting up *A. ispida* into subspecies, even if it is ever desirable to do so.

† 81. ALCEDO MOLUCCANA (Less.).

Blue-eared Kingfisher.

a. **Alcedo ispida** var. **moluccana** *(1)* Lesson, Voy. Coquille I, pt. 1, p. 343 (1826?).

b. **Alcedo ispida** var. *(1)* Lesson, Man. d'Orn. 1828, II, 89.

c. **?Alcedo bengalensis** *(1)* S. Müll., Verh. Natuurk. Comm. 1839—43, 87, 110; id., Reize Ind. Arch. 1858, II, 8.

d. **Alcedo ispidioides** *(1)* Less., Compl. Buff. 1837, IX, 345; *(2)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 652; *(3)* id., Orn. Pap. 1880, I, 408; Agg. 1889, 53; *(4)* W. Blas., P. Z. S. 1882, 703; *(5)* id. & Nehrk., Verh. z.-b. Ges. Wien 1882, 418; *(6)* W. Blas., J. f. O. 1883, 136, Nr. 36; *(VII)* Meyer, Vogelskel. pt. VII, 1884, p. 45, pl. LXIII; *(8)* W. Blas., Ztschr. ges. Orn. 1886, 92; *(9)* Grant, P. Z. S. 1888, 192; *(10)* Sharpe, Cat. B. XVII, 1892, 152; *(11)* Meyer, J. f. O. 1892, 258; *(12)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 7; *(13)* iid., ib. 1896, Nr. 2, p. 11; *(14)* Hartert, Nov. Zool. 1896, 175, 244.

e. **Alcedo moluccensis** *(1)* Blyth, J. A. S. B. 1846, XV, 11; *(II)* Sharpe, Monogr. Alcedin. 1870, 21, pl. 4; *(3)* Wald., Tr. Z. S. 1872, VIII, 45; *(4)* Brügg., Abh. Ver. Bremen 1876, V, 55; *(5)* Rosenb., Malay. Archip. 1878, 271; *(6)* Meyer, Ibis 1879, 64; *(7)* E. L. C. Layard, ib. 1880, 299; *(8)* Guillem., P. Z. S. 1885, 547, 566; *(9)* Tristr., Cat. Coll. B. 1889, 90; *(10)* Cab. & Rchw., Nomencl. Mus. Hein. 1890, 163.

f. **Alcedo minor moluccensis** *(1)* Schl., Mus. P.-B. Alcedin. 1863, 8; *(II)* id., Vog. Ned. Ind. Alcedin. 1864, 5, 44, pl. 1, fig. 4, 5; *(3)* id., Rev. Alcedin. 1874, 3.

g. **Alcedo ispida ispidioides** *(1)* Hartert, Nov. Zool. 1896, 571.

h. **Alcedo ispida moluccana** *(1)* Hartert, Nov. Zool. 1897, 160, 163.

"Kikis wowolean" (Kingfisher which lives on the river-side), Minahassa, Meyer *e 6.*

"Radja oudang biru" or **"Pasa biru"**, Minahassa, Nat. Coll. in Mus. Dresd.

"Sunti", Tonkean, E. Celebes, iid.

"Singtobu", Peling, iid.

For further synonymy and references see Sharpe *d 10.*

Figures and descriptions. Sharpe *e II, d 10*; Schlegel *f II*; Meyer *d VII* (skeleton); Salvadori *d 3*; W. Blasius *d 4, d 8.*

Adult. Similar to *Alcedo ispida*, but with the ear-coverts blue, like the cheeks, not cinnamon-rufous; the blue of the upper surface purer, not greenish blue (more campanula-blue instead of turquoise-blue or light cerulean), (Banka Id., N. Celebes, 15. V. 93, C 12258). Iris brown; tarsus bright red; bill black in the male.

Female. The females have the base of the lower mandible orange (Guillem. *e 8*).

Young. Upper surface blacker, the blue bars on the head being narrower, and the scapulars blackish; the blue of the back, rump and upper tail-coverts paler; basal part of mandible pale (N. Celebes, C 3615). "The young bird differs from the adult in having

the foreneck and chest obscured by dusky margins to the feathers; the scapulars are blackish slightly washed with blue" (Sharpe *10*). A young male (Dresden Mus. Nr. 6280) is without rufous on the lores, like a specimen (? ♀) from Ceram.

Measurements.

	Wing	Tail	Bill from nostr.	Tarsus
a. (C 12258) ad. [♂] Banka, Celebes 15. V. 93 . . .	73	31	31	9.5
b. (C 2316) ♀ Manado, Feb. 71	73	31	32.5	9.5
c. (C 3615) [♂] juv. N. Celebes	74	34	31.5	9
d. (Nr. 6284) ♀ Gorontalo, July 1871	72	31	35.5	9.5
e. (Nr. 6279) — Manado, Mch. 1871	73	33	31	9.5
f. (Nr. 6282) [♂] ad. Manado, Mch. 1871	72	31	34.5	9
g. (Nr. 6281) juv. Manado, Mch. 1871	76	32	28	—
h. (Nr. 6280) ♂ juv. Gorontalo, July 1871	66	28	21	8.5
i. (Nr. 6278) [♀] ad. Gt. Sangi	74	32	33	9.5
j. (C 12614) [♂] ad. Siao, 2. VII. 93	75	31	32.5	9.5
k. (Nr. 6283) ♀ Watubella	75	31	29.5	9.5
m. (C 7379) [♀?] Ceram	74	31	32.5	9
n. (C 9956) ad. ♂ New Britain, 25. V. 86	74	32	32	9

Skeleton.

Length of cranium	61.5 mm	Length of tibia	24.5 mm
Greatest breadth of cranium .	17.5 »	Length of tarso-metatarsus . .	9.0 »
Length of humerus	25.0 »	Length of sternum	24.5 »
Length of ulna	31.0 »	Greatest breadth of sternum .	18.0 »
Length of radius	29.0 »	Height of crista sterni . . .	7.0 »
Length of manus	23.0 »	Length of pelvis	22.5 »
Length of femur	16.7 »	Greatest breadth of pelvis . .	17.0 »

Distribution. Great Sangi (Meyer, Dresden Mus.); Siao (Nat. Coll.); Lembeh and Banka Is., off N. Celebes (Nat. Coll., Dresden Mus.); Celebes: — Minahassa (Wall. *d 10*, Meyer *e 6*, Guillem. *e 8*, etc.), Gorontalo (Forsten *f 1*, Rosenb. *f 3*), South Celebes (Doherty *h 1*), East Celebes (Nat. Coll.), Peling (Nat. Coll.), Sula Islands (Hoedt *f 3*) — Sula Besi (Bernstein *f 3*), Djampea and Kalao (Everett *d 14*); Buru, Amblau, Amboina, Banda, Ceram, Goram, Watubella, Obi, Halmahera, Batchian; Mysol, Salawatti, New Guinea — East Cape, New Britain, Duke of York Id., New Ireland, Solomon Islands (cf. Salvad. *d 3*); Fergusson Id. (Meek *d 14*).

As Dr. Sharpe remarks *(e II)* this bird seems to be the representative species of *Alcedo ispida* in the Moluccas. It will probably be found to be stationary, and *A. ispida* a migrant. Hartert says it is connected with a form of *A. ispida* by intermediate forms.

Very little is known of the habits of *A. moluccana*, but they appear to be the same as those of the common Kingfisher. Mr. Wallace *(e II)* says it frequents the banks of streams and eats small fish; Meyer *(e 6)* found it in Celebes at all times and everywhere near the sea-shore and rivers; Mr. E. L. C. Layard *(e 7)* found it only on the sea-shore in New Britain. The Common Kingfisher of Europe is often to be met with on the sea-shore, where it feeds largely on shrimps and prawns *(e II)*.

† 82. ALCEDO MENINTING Horst.

Malayan Kingfisher.

Alcedo meninting *(1)* Horsf., Tr. L. S. 1821, XIII, 172; *(II)* Temm., Pl. Col. 1823, Nr. 239, fig. 2; *(III)* Reichb., Hb. sp. Orn. Alcedin. 1851, 4, pl. 394, fig. 3050–51; *(4)* Schl., Mus. P.-B. Alcedin. 1863, 9; *(V)* id., Vog. Ned. Ind. Alcedin. 1864, 6, 44, pl. 3, fig. 2, 3; *(5bis)* id., Revue Alcedin. 1874, 5; *(6)* Salvad., Cat. Ucc. Borneo 1874, 93; *(7)* id., Ann. Mus. Civ. Gen. 1875, VII, 652; *(8)* Sharpe, P. Z. S. 1879, 329; *(9)* Vorderman, Nat. Tdschr. Ned. Ind. 1882, XLI, 185; *(10)* Oates, Str. F. 1882, X, 188; *(11)* W. Blas., J. f. O. 1883, 115; *(12)* id., Ztschr. ges. Orn. 1886, 94; *(13)* id., Ornis 1888, 307; *(14)* Vorderman, N. T. Ned. Ind. 1891, L, 434; *(15)* id., Notes Leyd. Mus. 1891, 124; *(16)* Hartert, Ornis 1891, 121; *(17)* Sharpe, Ibis 1894, 246, 258; *(18)* Everett, Ibis 1895, 30; *(19)* Vorderm., N. T. Ned. Ind. 1895, LIV, 334; *(19bis)* Blanf., Faun. Br. Ind. B. III, 1895, 125; *(20)* Kuschel, Orn. Mb. 1895, 156; *(21)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 1, p. 8; *(22)* iid., ib. Nr. 2, p. 11; *(23)* Hartert, Nov. Zool. 1896, 550.

a. **Alcedo asiatica** *(I)* Sws., Zool. Illustr. 1821, I, pl. 50; *(II)* Sharpe, Monogr. Alcedin. 1870, 25, pl. 5; *(3)* Wald., Tr. Z. S. 1872, VIII, 45; *(4)* Brügg., Abh. Ver. Bremen 1876, V, 55; *(5)* Meyer, Ibis 1879, 64; *(6)* Oates, B. Brit. Burmah 1883, II, 73; *(7)* Guillem., P. Z. S. 1885, 255; *(8)* Everett, J. Str. Br. R. A. S. 1889, 159; *(9)* Whitehead, Ibis 1890, 45; *(10)* Oates ed. Hume's Nests & Eggs 1890, III, 6.

"Sunti", E. Celebes, Tonkean, Nat. Coll.

"Tengkesi mosoni", Peling, iid.

The following authors more especially discuss local variations of this species:

On the typical Alcedo meninting.

b. **A. meninting** *(1)* Hume, Str. F. 1878, VI, 83, 84; *(2)* Sharpe, Cat. B. XVII, 1892, 157.

On Alcedo meninting rufigastra (Wald.).

c. **Alcedo meninting** *(1)* Beavan, Ibis 1867, 319 (Andamans).

d. **Alcedo rufigastra** *(1)* Wald., Ann. & Mag. N. H. 1873, XII, 487 (Andamans); *(2)* id., Ibis 1874, 136 (Andamans).

e. **Alcedo asiatica** *(1)* Hume, Str. F. II, 1874, 174, 494.

f. **Alcedo beavani** *(1)* Hume, Str. F. IV, 1876, 287, 383 (Andamans); *(2)* Sharpe, Cat. B. XVII, 1892, 160 (Andamans).

On Alcedo meninting rufigastra (Wald.), or a hardly distinguishable continental form, Alcedo meninting beavani (Wald.).

g. **Alcedo beavani** *(1)* Wald., Ann. & Mag. N. H. 1874, XIV, 158 (the name has special reference to Beavan's specimen from Maunbhoom); *(2)* id., Ibis 1875, 461 (Burmah); *(3)* Hume, Str. F. VI, 1878, 84, 499 (Tenasserim); *(4)* id., ib. VIII, 1879, 468, note (Sikhim); *(5)* id., ib. IX, 1880, 247 (Cachar); *(6)* id., ib. X, 1882, 188 (Pegu); *(7)* Sharpe, Cat. B. XVII, 1892, 160 (India to Cochin China; Celebes[1]); *(8)* Gurney, P. Z. S. 1895, 339 (Ceylon); *(9)* Blanf., Faun. Br. Ind. B. III, 1895, 124.

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[1] Other writers have hitherto identified specimens from Celebes simply as *A. meninting*. Dr. Sharpe accepts their determination and includes Celebes as a locality of the typical form, treated by him as a species for itself. The specimens from Celebes personally examined by him in the British Museum are, however, referred to *A. beavani*!

For further synonyms and references to the species see Sharpe *b 2*, *g 7*.

Figures and descriptions. Sharpe *a II*, *b 2*, *f 2*, *g 7*; Temminck *II*; Swainson *a I*; Reichb. *III*; Schlegel *V*, *4*; Walden *d 1*; Hume *b 1*, *e 1*, *f 1*, *g 3*.

Adult male. Like *A. moluccana*, but smaller; feet smaller and more delicate, inner toe more reduced, claw of inner toe slightly overreaching the base of the terminal joint (claw not counted as such) of middle toe, whereas in *moluccana* it reaches to the middle of it; back, rump, and upper tail-coverts cobalt; the blue of the other parts of upper surface more violet-blue; under surface chesnut cinnamon-rufous (Banggai Id. V.—VIII. 95, C 14728).

Adult female. In some parts of its range — probably in all parts — the under bill of the female is red or rufous.

"The adult female does not differ from the male as is usually asserted; but the blue cheeks and ear-coverts are not assumed so quickly as in the male. Traces of ferruginous are visible in these parts until the bird is aged" (Oates *a 6*, Pegu).

Young. "The young bird differs in having cheeks and ear-coverts ferruginous: in males the blue on these parts is quickly assumed, in females very slowly and some trace of ferruginous in these latter is generally present" (Gorontalo, Riedel — C 11097).

"Young birds able to fly have the bill black with the tip white; the legs pale red and the iris dark brown. One young bird, probably a male, has the whole plumage just as bright as the adult male, and the cheeks and ear-coverts blue" (Oates *10*).

Measurements.

	Wing	Tail	Exp. Culmen	Tarsus
a. (W. Blas. *12*) [♂] Gorontalo	65	28	36	
b. (W. Blas. *12*) [♀] Gorontalo	65	29	39	
c. (Petersb. Mus.) [♂ juv.] Gorontalo	61	27	—	8.5
d. (C 11097) [♀ juv.] Gorontalo	60	20	24	8.5
e. (C 14728) ad. Banggai, V.—VIII. 95 (Nat. Coll.)	64	26	39	8.5
f. (C 14593) ad. Peling, V.—VIII. 95 (iid.)	61	26	37	7.5
g. (C 14441) ad. Tonkean, E. Cel., V.—VIII. 95 (iid.)	64	28	38	8.5
h. (Sarasin Coll.) ♀ Macassar, 15. XII. 94	62	24	36	8.5

Eggs. 4 to 6; very glossy and round, white; average size 19.5 × 17.5 mm (Pegu — Oates *a 6*, *a 10*); glossy white; rather rounded, 20 × 16.5 mm (Labuan — Low *8*). 21 × 17 mm (Nehrkorn MS.).

Nest. A nest of this species described by Mr. Oates was in the steep bank of a ravine in thick forest. Gallery about one and a half feet long, terminating in a small chamber. Eggs laid on the bare soil *(a 10)*.

Breeding season. Pegu, July (Oates *a 6*).

Distribution of the species. Southern and Central India to the Eastern Himalayas (Sharpe *g 7*, Beavan *g 1*, Hume *g 4*, *g 5*, etc.); Burmah (Oates *a 6*, *g 6*); Tenasserim (Davison *g 3*); Andaman Islands (Beavan *c 1*, R. G. W. Ramsay *d 1*, *e 1*, Davison *e 1*, *g 7*); Cochin China (Brit. Mus. *g 7*); Malay Peninsula (Wall. *a II*, Davison *b 2*); Salanga (A. Müll. *12*); Penang (Cantor *6*, Wall. *b 2*); Singapore (Davison *g 7*, etc.); Sumatra (Raffl. *6*, Wall. *b 2*, etc.); Banka (Bossche *4*); Billiton (Vorderman *14*, *15*); Borneo (S. Müll. etc. *6*, *a 8*); Palawan (Whitehead *a 9*, Platen *13*); Balabac (Everett *18*); Sooloo Islands (Guillem. *a 7*, Everett *17*); Celebes: — Gorontalo (Riedel *12*, Rosenb. *5bis*), Togian Islands (Meyer *a 5*), Tonkean, E. Celebes (Nat. Coll.), Kandari, S. E. Celebes (Beccari *7*), Macassar (Wallace *a II*, *6*, *g 7*, P. & F. Sarasin), Peling and Banggai (Nat. Coll.); Java (Horsf. *1*, etc.); Lombok (Wall. *a II*, *b 2*, Vorderman *19*).

This species varies considerably for a Kingfisher in different parts of its range and is split up by Dr. R. B. Sharpe into two species, viz. *A. beavani* Wald., of the Andaman Islands, India and Burmah as far as Bankasoon (South Tenasserim) and Cochin China, occurring again in Celebes; *A. meninting* Horsf. ranging from Bankasoon down the Malay Peninsula to Sumatra, Borneo, Java and Lombok. Mr. Blanford *(19bis, g 9)* follows Dr. Sharpe

These two supposed species intergrade, as far as we can make out, between Burmah and Malacca, and either a system of subspecies should, if possible, have been created, or, as in the case of *A. ispida*, the badly understood local races might have been embraced under one name. The forms, which Dr. Sharpe brings together under the name *beavani*, Mr. Hume would unite as one with *meninting* or separate into two or three; of the South Indian birds he writes: "it must be understood clearly that this is not *beavani* [of the Andamans], but a form lying on the other side of *asiatica*" (Str. F. IV, 383), and later again: "I believe this ought to be separated as a distinct species" (Str. F. X. 1883, 352 note). Specimens from the Andaman Islands run to another extreme of coloration, but in Pegu and Tenasserim an intermediate form of *A. meninting* occurs which "is very close to, and runs into" the typical *A. beavani* *(g 3, g 6)*. Dr. Sharpe finds that the Indian variation repeats itself in Celebes; the fact is curious, but few specimens have been obtained in the island and more material may possibly serve to show that it differs. Three specimens from Borneo and one from Java in the Dresden Museum are more violet in hue than those before us from Celebes, Peling, and Banggai, and the bills of the former seem to be broader — in one case much longer and the wing shorter than in the Celebesian birds; also the reduced toe appears to be smaller. Schlegel remarks on Rosenberg's three specimens from Gorontalo that the colours of the upper surface incline strongly to green *(5 bis)*; the specimens in our hands do not confirm this statement, but show bright blue tints.

On the habits of this bird in Pegu Oates writes *(a 6)*: "This species is restricted to the dense forests, where the ground is broken up by nullahs and ravines. I think it always darts on its prey from a perch and does not hover in the air". In the Andamans its habits appear to differ: "it keeps exclusively (as far as I have observed)", says Davison, "to the salt water creeks, occasionally venturing out to the fishing stakes at the mouths of the creeks. Its voice is weaker, and not nearly so shrill as that of *A. bengalensis* (*A. ispida*); it feeds on small fish, after which it plunges, keeping under water for some considerable time" *(e 1)*.

GENUS PELARGOPSIS Glog.

The members of this genus are about the size of a Turtle-dove; the tail is longer than the bill, rounded; the bill about twice as long as the head, large, the culmen straight, flattened along its ridge; wing moderate, 3nd and 4th quills

longest, the 1st a little more than $^2/_3$ their length; inner toe as long or longer than the hallux, longer than the tarsus. About 5 species, with numerous local races, ranging from India to the Philippines, Celebes and Flores.

† * 83. PELARGOPSIS MELANORHYNCHA (Temm.).

Celebesian Stork-billed Kingfisher.

a. **Alcedo melanorhyncha** *(I)* Temm., Pl. Coll. 1826, pl. 391, livr. 66; *(2)* Schl., Handb. d. Dierk. 1857, 306; *(2)* id., Mus. P.-B. Alcedin. 1863, 15; *(IV)* id., Vog. Ned. Ind. Ijsvogels 1864, 10, 47, pl. 2, fig. 1; ? *(5)* id., Rev. Alcedin. 1874, 8.

b. **Dacelo melanorhyncha** *(1)* Less., Tr. d'Orn. 1831, 246 (Java!); *(2)* Finsch, Neu Guinea 1866, 160.

c. **Halcyon melanorhyncha** *(1)* Gray, Gen. B. 1846, I, 79; *(2)* Bp., Consp. 1850, I, 155; *(3)* Cass., Cat. Halc. Philad. Mus. 1852, 10; *(4)* Wall., Ibis 1860, 142; ? *(5)* id., P. Z. S. 1862, 335, 338; *(6)* Gray, HL. 1869, I, 92; *(7)* Rosenb., Malay. Archip. 1878, 271; *(8)* Pelz. u. Lorenz, Ann. k. k. Nat. Hofmus. Wien 1886, I, 258.

d. **Hylcaon melanorhyncha** *(I)* Reichb., Hb. spec. Orn., Alcedin. 1851, 18, pl. 399, f. 3074.

e. **Rhamphalcyon melanorhyncha** *(1)* Bp., Consp. Vol. Anisod. 1854, 10.

Pelargopsis melanorhyncha *(1)* Sharpe, P. Z. S. 1870, 62; *(II)* id., Monogr. Alcedin. 1870, pp. XXVII, 95, pl. 29; *(3)* Wald., Tr. Z. S. 1872, VIII, 45; *(4)* Salvad., Ann. Mus. Civ. Gen. 1875, 13; *(5)* Brügg., Abh. Ver. Bremen 1876, V, 55; *(6)* Meyer, Ibis 1879, 64, 146; *(7)* W. Blas., J. f. O. 1883, 136; *(8)* Guillem., P. Z. S. 1885, 547; *(9)* W. Blas., Ztschr. ges. Orn. 1886, 92; *(10)* Cab. & Rchnw., Nomencl. Mus. Hein. 1890, 165; *(11)* Sharpe, Cat. B. XVII, 1892, 97; *(12)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 7; *(13)* Hart., Nov. Zool. 1897, 163; *(XIV)* Meyer, Abb. v. Vogelskel. 1897, pl. II, CCXV.

"Radja udan puti" (White king of the Crabs), Minahassa and the islands off the coast, Meyer *6*, Nat. Coll.

"Bua-Buaa", Rosenb. *c 7*, ? Gorontalo.

Figures and descriptions. Sharpe *II* (imm.), *1*, *11*; Meyer *XIV* (skeleton); Temminck *a I*; Reichb. *d I*; Schlegel *a IV*, *a 3*.

Adult. Head, neck and body above and below cream-colour, becoming darker, buff, more on abdomen; cheeks, around eye, and forehead drab, the feathers bordered with cream-colour; scapulars, wings and tail drab with green and bluish reflections, changing with the light; inner webs of quills below buffy white, the colour spreading out over the under side of the wing towards the base of the feathers (Banka Id., N. Celebes, 20. V. 93 — C 12254). Iris yellowish brown, feet red-brown; claws and bill black (M. *6*).

Sexes. Alike.

Immature. Like the adult, but entire head above and cheeks pale smoke-grey; darker towards the forehead, with darker centres to the feathers; lores, ear-coverts, middle of mantle, scapulars, wings, tail, and the longer upper tail-coverts brown, much darker than in the adult, with greenish or bluish reflections; back and rump pale blue (!) upon a buff ground; breast and sides of neck barred with faint drab-colour; bill shorter than in the adult, black, horn-colour at extreme tip (near Manado, Aug.—Sept. 1892, C 10865).

Measurements.	Wing	Tail	Bill from nostril	Tarsus
a. (C 12254) [♂] ad. Banka I., 20. V. 93	154	101	69	15
b. (C 12255) [♂] ad. Banka I., 18. V. 93	153	—	64	15
c. (Nr. 6245) ♂ ad. Manado	145	87	68	16
d. (Nr. 6244) ad. Manado, Mch. 71	147	91	65	—
e. (Nr. 3809) ad. N. Celebes	151	92	65	15
f. (C 12253) [♀] ad. Manado tua Id., 15. IV. 93 . . .	149	87	62.5	15
g. (C 10866) imm. near Manado, Aug.—Sept.	145	87	63.5	15.5
h. (C 10865) imm. near Manado, Aug.—Sept.	152	94	59	16.5

The wing-lengths of 5 additional specimens from Lembeh Id. and the Minahassa fall within the above measurements.

In the young specimen *h* the tarsus and tibio-tarsal joint is curiously padded below with thick porous, yellow skin. This is not seen in the older birds, and in this specimen it is about to be cast off. Probably the young have the habit of resting on their "heels", and these calosities serve as a protection to them[1]).

Eggs. Unknown. Always two in number (M. *6*).

Distribution. Celebes and the Sula Islands: — Manado tua & Banka Is., off N. Celebes (Nat. Coll. in Dresden Mus.), Lembeh Id. (Guillemard *8*, N. Coll.), Minahassa (Wall. *c 4*, Meyer *6*, *etc.*), Gorontalo Distr. (Rosenb. *a 5*), Pogoyama, Gulf of Tomini (Guillem. *8*), Paguatt and Posso, Gulf of Tomini (Rosenb. *a 5*), Togian Islands (Meyer *6*); Kandari, S.E. Celebes (Beccari *4*), Tawaya, W. Celebes (Doherty *13*), Sula Besi and Sula Mangoli (Allen *c 5*, Bernst. *a 5* — if identical).

This Kingfisher is, as Dr. Sharpe remarks *(1)*, the most distinct species of the genus *Pelargopsis*. The black bill and the absence of blue on the back of the adult bird at once distinguish it from the other members of the genus *Pelargopsis*, about ten in number, which range from Ceylon and India as far as the Philippines and Flores and have all red bills and blue backs and rumps. Nevertheless, the young of *P. melanorhyncha* has, as shown above, a light blue back, which, it would seem, is soon lost — proof that *P. melanorhyncha* is derived from a form with a blue back. The young of other species do not differ appreciably in coloration, as far as is known, from the adults. Hartert *(13)* says that some of his specimens from West Celebes have a small red spot at the base of the maxilla; there is a tendency to redness at the extreme base of the bill in one or two of our specimens from the Minahassa. *P. melanorhyncha* was separated by Reichenbach as a subgenus on the ground of a supposed difference of structure of the bill. Like Dr. Sharpe and others, we do not find that its bill differs in any important particular from those of others of its genus, except in colour. In the Celebes Province *Pelargopsis* has undergone the greatest modification, it has lost the blue on the back and rump and acquired, apparently, its black bill there.

Similarly *Eudynamis melanorhyncha* of Celebes and Sula has a black bill,

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[1]) See Munn, Ibis 1893, 58, for a similar pad in the young *Pelargopsis gurial*, and Günther, ib. 1890, 411 in *Iynx torquilla*.

though everywhere else the bill of *Eudynamis* is whitish. In Celebes, too, the Lories, *Trichoglossus ornatus* and *Psitteuteles meyeri*, and in Sula *Psitteuteles flavoviridis*, have lost the band of bright colour across the base of the wing below, so that the whole of underside of the quills is uniform dusky shining smoke-grey.

The nearest ally of *P. melanorhyncha* after *P. dichrorhyncha*, appears to us to be *P. gigantea* Wald. — by no means a gigantic member of its genus — of the southern Philippines, a form regarded by Sharpe as a "subspecies" of *P. leucocephala* of Borneo. *P. melanorhyncha* may perhaps be regarded as a somewhat recent immigrant to the Celebes Province — not as one of the ancient types of the country; because 1. its modifications are slight as compared with those of the Bee-eater, *Meropogon*, for instance, with its nearest ally, *Nyctiornis* of India to Borneo, or of the Hornbill, *Rhabdotorrhinus*, with *Penelopides* of the Philippines; 2. members of the genus are known to be birds of good flying powers; 3. a form of *Pelargopsis*, *P. floresiana*, treated by Sharpe as only subspecifically distinct from other forms ranging from India to Java and Borneo, makes nothing of Wallace's line between Bali and Lombock, being found in Flores[1]); 4. the circumstance that *P. melanorhyncha* throws back, when young, to the other members of the genus in having a blue back seems to betoken that the adult plumage is not very ancient.

Touching the last point, a few general remarks on the plumage of the Kingfishers will be found further on under *Ceycopsis fallax*. On the habits of this species Meyer *(6)* notes briefly that it is "on riversides rather rare; always in pairs together. On the 26th of February I shot on the river Tamumpat, near Manado, a female; and the male flew for hours up and down the river, crying for its mate; every half hour it passed my resting-place. It has a very quick arrow-like flight, feeds on large and small fishes, and always lays two eggs".

+ 84. PELARGOPSIS DICHRORHYNCHA M. & Wg.

Red-and-black-billed Kingfisher.

Plate IX.

Pelargopsis dichrorhyncha *(1)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 2, p. 12; *(2)* Hartert, Nov. Zool. 1897, 163.

"Bukaka mawuti", Banggai, Nat. Coll.

Diagnosis. Similar to *P. melanorhyncha*, but with more or less of the culmen and base of the maxilla and most of the under mandible red, the rest black; size somewhat larger.

Measurements. Wing 151—161 mm; tail c. 100; bill from nostril 67—73; tarsus c. 17.

Distribution. Peling and Banggai Islands (Nat. Coll.).

The Stork-billed Kingfisher of Celebes has been recorded from Sula by Wallace (P. Z. S. 1862, 335, 338), Schlegel (Mus. P.-B. Rev. Alced. 1874, 8)

[1]) Dr. Sharpe is of opinion that this species crossed the strait by flight (Monogr. p. XLI).

and Sharpe (Cat. B. 1892 XVII, 97). Mr. Wallace speaks of the base of the bill as red. A comparison of them with *P. dichrorhyncha* is desirable, as Sula birds generally have much more in common with those of Peling than with those of Celebes.

This Kingfisher is easily distinguishable from that of the mainland of Celebes by its dichromatic bill, but the distribution of the two colours red and black thereon is subject to much individual variation; in one or two specimens in the Dresden Museum the entire upper mandible is black except at the base, in another example more than half of it is red; the under mandible seems to be always red for at least the basal half, sometimes the terminal fourth only is black.

The type and co-types, which were obtained by our native hunters in Peling and Banggai between May and August, 1895, are in the Dresden and Tring Museums.

GENUS CEYX Lac.

Small Kingfishers, similar to *Ceycopsis*, but having only three toes, the inner (second) toe being absent.

About 18 species in the Indian and Papuan countries.

† * 85. CEYX[1]) WALLACEI Sharpe.

Sula Three-toed Kingfisher.

a. **Ceyx lepida** *(1)* Wall. (nec Temm.), P. Z. S. 1862, 338; *(2)* Finsch, Neu-Guinea 1866, 161, pt.

Ceyx wallacii *(1)* Sharpe, P. Z. S. 1868, 270; *(II)* id., Monogr. Alcedin. p. 129, pl. 45 (1868); *(3)* Salvad., Orn. Pap. 1880, I, 417; *(4)* Sharpe, Cat. B. XVII, 1892, 182.

b. **Dacelo wallacei** *(1)* Schl., Revue Alcedin. 1874, 34.

c. **Dacelo cajeli** *(1)* Schl., Ned. Tdschr. Dierk. 1866, III, 339, pt. (Soula).

Figure and descriptions. Sharpe *1, II, 4.*

Adult. Above black; head and nape spotted with cobalt, more on the nape, each feather having a mesial stripe of brighter blue; cheeks and wing-coverts streaked with bright cobalt; back very rich shining cobalt; the uppper tail-coverts slightly tinged with ultramarine; scapulars black; quills and tail-feathers blackish, the inner web of the former light rufous towards the base; throat whitish; loral spot and the whole of the under surface deep orange; a patch at the sides of the the uppper breast black; "bill and feet coral-red; iris dark" (A. R. Wallace).

Measurements. Total length 141 mm, culmen 36, wing 63, tail 25, tarsus 7.6 (Sharpe *4*).

Distribution. Sula Islands (Allen *a 1*) — Sula Besi (Bernstein *b 1*), Sula Mangoli (Hoedt *b 1*).

This little three-toed Kingfisher was first obtained by Mr. Wallace's assistant, Allen, in Sula Besi or Mangoli, where further specimens were obtained in 1864 by Bernstein and Hoedt.

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[1]) "Ceyx" — a substantive of masculine gender.

Its nearest ally is *Ceyx cajeli* Wallace of Buru, which differs chiefly in having the cheeks and ear-coverts black, and the back silvery blue, instead of cobalt (Sharpe), and a shorter bill. This form is reported by Schlegel to have been observed in Sula, but this rests no doubt upon an error of identification.

The genus *Ceyx*, as Dr. Sharpe points out, consists of two divisions, "the rufous-backed section and the blue-backed section", which "have distinct ranges, the one being Indo-Malayan, and the other Austro-Malayan" (Monogr. p. XLI). Elsewhere (p. XXIX), the author further divides *Ceyx* into four groups: —

1. The *C. tridactylus*-group with red bills and lilac plumage, corresponding to the rufous-backed section;
2. *C. lepidus*-group with red bills but blue plumage;
3. *C. solitarius* with a black bill, to which *C. gentianus* Tristr. may now be added;
4. *C. philippensis* (= *C. cyanipectus* Lafr.) with a blackish upper and orange lower mandible, to which several recently discovered species may be added, if *C. argentatus* Tweedd. and *flumenicolus* Steere do not constitute a fifth group for themselves.

The present species, *Ceyx wallacei* belongs to the second, or *Ceyx lepidus*-group.

After a comparatively brief study of the genus *Ceyx* under the excellent guidance of Dr. Sharpe's great "Monograph of the Alcedinidae" and his more recent Catalogue of the Kingfishers, it may seem presumptuous to criticise his conclusions; yet it may well be asked why the genus *Ceyx* is put into one subfamily, the *Daceloninae*, and the genus *Alcyone* into another, the *Alcedininae?*

The differences between the extreme members of these two groups, *Dacelo* or *Melidora* and *Alcedo*, are most interesting and important, and in 1892 Dr. Sharpe maintains his subdivisions of 1870; the *Alcedininae* are stated to be distinguished by a "bill long and slender, and perceptibly keeled, habits mainly piscivorous"; the *Daceloninae* have the "bill more or less depressed; culmen rounded or flattened, sometimes even grooved. Habits mainly insectivorous or reptilivorous" (Cat. B. XVII, 93). Yet in the earlier work, the close correspondence of *Alcyone cyanipectus* with *Ceyx philippinensis* is commented upon; "Count Salvadori, who has paid much attention to these birds, stipulates for their both being placed in the genus *Alcyone*; but I would rather keep them in the genus *Ceyx*, because we should then have plumage as an additional generic character" (p. VII); later Major Ramsay and Dr. Sharpe decided that *Alcyone cyanipectus* is the male and *Ceyx philippinensis* the female of the same species (Ibis 1884, 332, pl. IX) a view which received full confirmation from Messrs. Bourns and Worcester (Ibis 1895, 404), though at one time (Ibis 1895, 112) doubted by Mr. Grant, but afterwards also consented to by him (Ibis 1896, 471). They are now placed by Sharpe in the genus *Ceyx*, by Grant in the

genus *Alcyone*. Observations on the habits of *Ceyx* are scanty; they were still scantier at the date of appearance of the 'Monograph', and our leading Alcedinist was induced to conclude that *Ceyx* differed more widely from the *Alcedininae* than now appears to be the case: "*Alcyone* is a fish-eater and partakes of the characteristics of true *Alcedo*; . . . *Ceyx*, on the other hand, is a forest-loving genus, living away from the water, feeding on insects, and bearing affinity towards *Halcyon*" (ib. p. VIII). Notes that have since appeared in "Stray Feathers" and elsewhere tend to show that, while *Ceyx* avoids broader waters, it is generally to be found by small streams — sometime, indeed, dried up ones — in deep forest or jungle. Legge (B. Ceylon, 304) says *Ceyx tridactylus* subsists on diminutive fish and small aqueous insects; a writer in Hume's "Nests and Eggs of Indian Birds" (Oates ed. III, 14) says: "as far as I have been able to ascertain, it is entirely a fish-eater, though it may also devour water-insects, small prawns, etc. I have never seen any remains of insects in its stomach". Other observers — De Bocarmé, and Wallace — testify to the insectivorous and crustacivorous habits of species in Borneo and Java (Sharpe, p. 120) while *Ceyx cajeli* — and, therefore, probably its near ally *C. wallacei* — was observed by Wallace to feed on water-insects and small fish (Sharpe, p. 127). From this it appears certain that *Ceyx* must be set down as a semi-piscatorial bird, in habits a link between *Alcedo* and *Halcyon*.

Further, in plumage the genus *Ceyx* is a link between *Alcedo* and certain *Daceloninae*. Dr. Sharpe has called attention to the close resemblance borne by the female *Ceyx cyanipectus* (*Ceyx philippinensis*, Monogr. p. 113) to *Alcedo moluccana*, and remarks that Lesson erroneously referred *Ceyx solitarius* to *Alcedo meninting*. Altogether, the plumage of the blue-backed section of *Ceyx* is distinctly Alcedinine. The red-backed section on the other hand, especially *Ceyx rufidorsus* (= *euerythrus* Sharpe), recalls — save for the absence of the blue rump — the peculiar plumage of the wide-spread *Halcyon coromanda* (*Callialcyon*. Compare, Sharpe, pl. 41 with pl. 57). Thus Sharpe remarks: "the link towards *Halcyon* seems to be in the lilac-backed section of the genus *Ceyx* with the lilac-backed section of the genus *Halcyon*, where the tail is rather shorter than in most of the other members of the genus" (Mon. p. XLVI. In plumage, as in habits, the two sections of the genus *Ceyx* appear to unite the *Alcedininae* and *Daceloninae*.

The question now suggests itself: did *Ceyx* arise from *Halcyon* and *Alcedo* from *Ceyx*, or was the reverse the order of development, or, as might also be thought possible, did both *Alcedo* and *Halcyon* take their origin from *Ceyx*, the one from the blue-, the other from the lilac-backed section of it? Perhaps Dr. Sharpe, following up his conclusions of 1870, and students of the Kingfishers in the future will be able to read as from a book the past history of the family, undoubtedly impressed upon their plumage and structure, but at present hidden from ornithological knowledge. One small token we believe

ourselves able to point to, which goes to confirm the conclusions arrived at by Dr. Sharpe from other lines of reasoning — namely, that *Dacelo* and *Melidora* "are the most ancient form of Kingfisher extant", while "*Alcedo*, the most specialized type of the family *Alcedinidae*, . . . belongs to a more recent development" (Mon. p. XLIV). This seems to be indicated by the immature plumage of *Ceycopsis fallax* of Celebes, which, as Sharpe says (p. XII), presents "a recognisable link between the Aethiopian *Ispidinae* and the Malayan *Ceyces*", and further on again (p. XLI) "it unites the characters of the two groups of the genus *Ceyx*, which converge from opposite sides upon its flanks, as one may say; for it is red in general plumage, but has a bright blue back". We pass on, therefore, to the consideration of this interesting Celebesian species, the next in our list.

GENUS CEYCOPSIS Salvad.

A genus peculiar to the Celebesian area; small Kingfishers about the size of a Sparrow, recognisable by their having the inner toe much reduced, shorter than the hallux (shorter also than the tarsus and less than half the length of the middle toe); bill red, about half as long again as the head, rather flat, at the base across the nostrils about as broad as it is high; tail small, shorter than the bill; wing rather short, 2nd, 3rd and 4th quills longest, 1st a little shorter. Two closely allied species, inhabiting Celebes and Sangi respectively.

† * 86. CEYCOPSIS FALLAX (Schl.).

Fallacious three-toed Kingfisher.

Plate X.

a. **Dacelo fallax** *(1)* Schl., Ned. Tdschr. Dierk. 1866, III, 187; *(2)* id., Revue Alcedin. 1874, 32; *(3)* Rosenb., Malay. Archip. 1878, 272, 584.

Ceycopsis fallax *(1)* Salvad., Atti Acc. Sc. Torino 1869, 447; *(II)* Sharpe, Monogr. Alcedin. 1870, pp. XII, XXIX, XLI, XLVI, 135, pl. 48; *(3)* Wald., Tr. Z. S. 1872, VIII, 49, 112; *(4)* Meyer, Ibis 1879, 63, partim; *(5)* W. Blas., J. f. O. 1883, 136; *(6)* Guillem., P. Z. S. 1886, 548; *(7)* id., Cruise "Marchesa" 1886, II, 198; *(8)* W. Blas., Ornis 1888, 572, partim; *(9)* Sharpe, Cat. B. XVII, 1892, 190; *(10)* Hartert, Nov. Zool. 1896, 158; *(11)* id., ib. 1897, 163.

b. **Ceyx fallax** *(1)* Gray, HL. 1871, III, 227; *(2)* Brügg., Abh. Ver. Bremen 1876, V, 55; *(3)* Tristr., Cat. Coll. B. 1889, 92.

"Radja udang mera ketjil", Minahassa, Nat. Coll.

Figure and descriptions. Sharpe *II*, *9*; Schlegel *a 1*, *a 2*, Brüggemann *b 2*.

Adult. General colour above dark reddish hazel: head above including nape brownish black spangled with bright ultramarine-blue, each feather having a subterminal spot; on middle wing-coverts a few spots of a rather lighter colour, lores ferruginous; ear-coverts and cheeks also ferruginous, but washed with purple of a magenta tint into which the blue of the head-spots passes on the sides of the crown; lower back and rump whitish turquoise-blue, becoming azure-blue on the upper tail-coverts; quills and tail dusky; chin and throat white; feathers of ear-coverts continued

into a whitish band on sides of neck; remainder of under surface rufous, darkest and more ferruginous on sides of breast, palest and more orange-rufous on the middle parts of under surface, on under wing-coverts, and edge of wing; middle of abdomen lightly washed with lilac; inner edge of quills below towards their base dull rufous vinaceous (near Manado, Aug.—Sept 1892, C 10867). "Iris brown; bill brilliant coral; feet bright coral red" (Guillem. *7*, Rosenb. *a 1*).

The lilac tint mentioned in Dr. Sharpe's description *(9)* of male (?) does not extend on to the lower back of this example. In adults according to Schlegel *(a 1)*, the rufous of the under surface passes into whitish on the abdomen. This also does not seem to be the rule; on the other hand the lower breast is washed with lilac in some adults.

Female. According to Mr. Hartert *(11)* the female is of a much darker and less rufous brown above.

Immature. A younger specimen has the blue spots of the head duller and less sharply defined, and of a more magenta tint on towards the nape, under surface and rump and upper tail-coverts without any lilac tint; the wing-coverts browner, some obscure spots of purplish blue on the middle series; bill pale greenish horn-colour, blackish on basal part of ridge of upper mandible (Minahassa, Nr. 1903).

Young. A specimen kindly lent to us by Mr. Pleske is like the last, but with scantier blue tips to the feathers of the head, those on the nape of a paler more lilac purple; breast somewhat darker (N. Celebes — 1889). The young are lighter reddish above, have less blue on the head, and want the lilac wash on the lower breast, the upper mandible is dusky (Lembeh, March 1895, C 14206, 14210). Schlegel, after von Rosenberg, describes the bill of the young as "noirâtre" *(a 1)*; Dr. Guillemard shot a specimen with the bill slate, lower mandible red *(6)*. On referring to Sharpe's recent Catalogue, we find that the bright red bill is a character of the adult in the *Ceyx* genus; that of the young of *Ceyx bournsi* is of a duller red than in the adult, of *C. malamaui* more dusky, whitish horn-colour, of *C. melanurus* horny whitish, of *C. dillwynni* (nestling) blackish horn-colour, of *C. tridactylus* paler, dusky at base of both mandibles.

Eggs and breeding habits. Unknown.

Measurements.

	Wing	Tail	Tarsus	Bill from nostril
a. (C 10867) ad. near Manado	56	22	9	28.5
b. (Nr. 1903) imm. Minahassa	58	24.5	9	29
c. (Tring) ad. Lembeh, 3. III. 95 (Nat. hunters)	59	22	—	29
d. (C 14207) ad. Lembeh, 21. II. 95 (Nat. hunters)	60	26	—	29
e. (C 14208) ad. Lembeh, 27. II. 95 (Nat. hunters)	59	—	8.5	—
f. (Tring) ad. Lembeh, 6. III. 95 (Nat. hunters)	54	—	8.5	—
g. (C 14209) ad. Lembeh, 3. III. 95 (Nat. hunters)	57	21.5	9.5	30
h. (Tring) ad. Lembeh, 16. III. 95 (Nat. hunters)	57	—	9.0	30.5
i. (Tring) ad. Lembeh, 4. III. 95 (Nat. hunters)	57	22	—	30
j. (C 14206) juv. Lembeh, 11. III. 95 (Nat. hunters)	58	—	—	27.5
k. (C 14210) juv. Lembeh, 1. III. 95. (Nat. hunters)	58	—	—	27.5

Distribution. Celebes:— Minahassa (v. Duivenbode *a 2*, Meyer *4*, Guillem. *7*); Lembeh Id. (Nat. Coll. in Mus. Dresden and Tring); Gorontalo Distr. (v. Rosenb. *a 2*, Meyer *4*); Dongala and Tawaya, W. Celebes (Doherty *11*); South Celebes, Maros (Meyer *4*), Indrulaman (Everett *10*).

Variation. The specimens from Lembeh vary somewhat individually, some having the bases of the blue-tipped feathers of the head rufous, others most of them dusky, the latter specimens, with one exception *(c)*, have the scapulars duller and browner. These differences are shared by the two immature birds, there being one of each, distinguishable as young by their partially dusky and shorter bills and absence of blue spots on the wing-coverts. The more red or dusky colours are probably differences of a sexual nature.

This little Kingfisher was not discovered until 1863—1864, when von Rosenberg obtained the first specimens in the Province of Gorontalo; it is still a rare species in collections. Meyer remarks *(4)*: "I got this species near Manado, near Gorontalo, and at the waterfall of Maros, in South Celebes; but I did not procure many specimens, perhaps for the reason that it lives in the forest and is a small species. In May a living specimen was in my possession at Manado. The colours of this little species are very delicate. It is the loveliest Kingfisher of Celebes". One of Dr. Guillemard's specimens was, curiously enough, shot on the sea-coast at Wallace Bay, N. Celebes, "on the lonely beach frequented by the Maleos *(Megacephalon maleo)* described by Wallace in his 'Malay Archipelago'" (I, p. 413).

In the foregoing article on *Ceyx wallacei* attention was drawn to Dr. Sharpe's remarks pointing out the interesting position occupied by *Ceycopsis fallax*. In the structure of the foot it is a connecting link between *Ispidina* (with *Myioceyx*) of Africa and Madagascar and *Ceyx* of India and the East Indies; in plumage it is a connecting link between the red-backed section of *Ceyx* of India to the Lesser Sunda Islands, Borneo, and the Philippines, and the blue-backed section of *Ceyx* of Papuasia and the Moluccas to Sula and the Philippines. Further, from the extreme members of the red-backed divisions of *Ceyx* and of *Ispidina* to the blue-backed divisions of the same genera a gradual transition from the plumage of *Callialcyon* to that of *Alcyone* and *Alcedo* is seen. The little *Ceycopsis fallax* occupies a middle position. It appears to us that, when growing into adult plumage, the bird develops towards the *Alcedo*-type, rather than in the opposite direction, since the blue spangles on the head become brighter, bluer, better defined, and extended further back on the hind neck. A future worker on the Kingfishers will no doubt find more such indications; the present one is a hint — if it does not mislead us — that the blue-backed, *Alcedo*-like *Ceyces* are derived from the red-backed ones[1]). That is to say, the *Ceyces*, which are now found between the Philippines and the Solomon Islands, appear to be descended from those now known from India to the Philippines.

It is hardly possible to say between which red-backed and which blue-backed *Ceyx Ceycopsis fallax* most immediately lies; we should place it between the red-backed *Ceyx melanurus* of Luzon and the blue-backed *C. wallacei* of Sula; *Myioceyx* of West Africa has also a good deal in common with it; but other ornithologists may think differently as to its nearest affinities.

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[1]) The young of *Ispidina leucogaster* has most of the crown ferruginous (Sharpe, Cat. 194).

Ceycopsis has four toes — the inner one very minute — *Ceyx* has three; it may insult the convictions of many anatomists if called upon to admit that a bird with four toes may be intermediate between two sections of a genus with three; still more outrageous seems the assumption that *Alcedo* with four toes can be descended from *Ceyx* with three. We do not, of course, suggest that such is the case; but once undoubtedly *Ceyx* had four toes and the second of *Ceycopsis* was much larger than it is now.

It is possible that a future worker on the Kingfishers of the genera *Alcedo*, *Alcyone*, *Ceyx*, *Ceycopsis*, *Ispidina* and *Myioceyx* will come to the conclusion that the red and the blue types of plumage in these genera have persisted since all agreed in having four toes; that since then the small inner toe has become completely aborted in both the red and most of the blue forms in the East Indies, except Celebes, where the process as seen in *Ceycopsis* is not quite complete. In any case *Ceycopsis* may be regarded as a rather ancient form. We do not know how it got to Celebes, but its ancestors appear to be the red forms of *Ceyx* of the islands to the west and the Indian countries.

It is a mystery why the second toe in certain Kingfishers has become aborted, and we are at a loss to make a suggestion for the explanation of the fact. Can there be a reason in their habits or their mode of life?

+ * 87. CEYCOPSIS SANGIRENSIS M. & Wg.

Sangi Fallacious Kingfisher.

Plate X.

a. **Ceycopsis fallax** *(1)* Meyer, Ibis 1879, 63 partim; *(2)* id., Isis, Dresden 1884, 6; *(3)* W. Blas., Ornis 1888, 572 partim.

Adult. Similar to *Ceycopsis fallax* of Celebes, but with the blue spots of the head above much larger and continued further down the hind neck, the spots on the sides of occiput almost running into one another, and blue like those of the head, not magenta; the spots on the middle and greater wing-coverts larger, magenta; mantle washed with magenta; bill longer and differing in shape — not so much narrowed in its terminal third or so much broadened at its base; size a little greater (Tabukan, Great Sangi, Meyer in Vienna Museum 1877, Nr. II i).

Immature (with a dusky horn-coloured bill). Just like the adult, but with none of the feathers of the mantle tinted with magenta, the blue on the head and neck a trifle darker and the ear-coverts less strongly washed with magenta (Tabukan, Great Sangi, Meyer — Nr. 6225).

Measurements.	Wing	Tail	Bill from nostril	Tarsus
a. (Vienna Mus.) ad. Gt. Sangi	60 [1])	28	33	9
b. (Nr. 6225) imm. Gt. Sangi	62	25.5	31	9

Distribution. Tabukan, Great Sangi (Meyer *a 1*, *a 2*), where it appears to be plentiful.

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[1]) The ends of the quills are frayed, so that 1 or 2 mm should be added to make up their original length.

The most important points of difference in this form of *Ceycopsis* appear to be the differently shaped bill, and the large size and great extent on the sides and back of the nape of the blue spots or bars of the head; on the sides of the nape, in fact, they blend into almost continuous blue. *Ceycopsis* is a peculiarly Celebesian genus, as remarked above.

GENUS HALCYON Sw.

This large genus has been split into eleven, chiefly by Cabanis & Heine and Bonaparte, and it contains indeed a number of forms which might perhaps be allowed subgeneric distinction, but for the present Dr. Sharpe has no doubt done useful work in gathering them together, though it might be puzzling to distinguish all members of the genus by his key.

These Kingfishers are of medium size, from the size of a Lark to that of a Thrush. The tail is longer than the bill; the inner toe, the hallux, and the tarsus are of about equal length with one another. Compared with *Pelargopsis*, *Halcyon* may be recognised by its flatter bill and rounded culmen; measured at a level with the anterior end of the nostril the bill is as broad as it is deep; in *Pelargopsis* it is very much narrower than deep; on the other side of *Halcyon* may be placed *Dacelo* and *Sauromarptis* of the Australian Region, in these the bill is very broad, the length from the nostril being only 2 to $2^1/_2$ times its width, as against 3—4 times in *Halcyon*, or sometimes over 4 times in *Pelargopsis*.

Mr. Blanford (Faun. Br. Ind. B. III, 1895, 119) recognises *Halcyon* (containing *H. pileata*), *Callialcyon (H. coromanda)*, and *Sauropatis* (*H. chloris*, also *H. sancta*) as distinct genera; in the first-named the primaries are white at the base and the bill is red; the bill is also red in *Callialcyon*, but in *Sauropatis* it is black on the upper mandible and on the terminal part of the lower. In *Sauropatis* it should be added that the first primary is nearly as long as the second and third and about equal to the fourth; in *Callialcyon*, as in typical *Halcyon*, it is shorter — the tip about half way between the secondaries and the wing-tip. Sharpe (1892) recognises 53 species of *Halcyon*, inhabiting Africa, the warmer parts of Asia to Australia.

88. HALCYON COROMANDA (Lath.).

Ruddy Kingfisher.

This species ranges from the Himalayas, East China, and Japan, south to the Philippines, Celebes, Java, and the Andaman and Nicobar Islands[1]). It varies locally. The Celebes form has received a name, and it may, apparently, be allowed to stand as a subspecies without causing confusion.

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[1]) It is absent, according to Blanford, in the Indian Peninsula.

* Halcyon coromanda rufa (Wall.).

a. **Halcyon rufa** *(1)* Wall., P. Z. S. 1862, 338.
b. **Dacelo coromandeliana** *(1)* Schl., V. Ned. Ind. Ijsvogels 1864, 24, 56 (Celebes, Sula).
c. **Dacelo rufa** *(1)* Finsch, New Guinea 1866, 160.
d. **Halcyon coromanda** *(1)* Sharpe, Monogr. Alcedin. 1870, 155 (Celebes), pl. 57, front figure (type of *H. rufa*); *(2)* Guillem., P. Z. S. 1885, 548; *(3)* Hickson, Nat. in N. Celebes 1889, 90; *(4)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 9, p. 3 (Talaut).
e. **Callialcyon**[1] **rufa** *(1)* Wald., Tr. Z. S. 1872, VIII, 44; *(2)* Salvad., Ucc. Borneo 1874, 102; *(3)* id., Ann. Mus. Civ. Gen. 1875, VII, 653; *(4)* Meyer, Ibis 1879, 62, 146; *(5)* W. Blas., J. f. O. 1883, 136; *(6)* Meyer, Isis, Dresden 1884, 6; *(7)* W. Blas., Ztschr. ges. Orn. 1885, 246; *(8)* id., ib. 1886, 90; *(9)* id., Ornis 1888, 572.
f. **Dacelo coromanda** *(1)* Schl., Revue Alcedin. 1874, 17 (Celebes, Sula, Sangi).
g. **Halcyon coromanda** var. **rufa** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 54.
h. **Halcyon coromanda rufa** *(1)* Stejn., Pr. U. S. Nat. Mus. 1887, X, 403; *(II)* Meyer, Abb. v. Vogelskel. 1897, II, pl. CCXVI.
i. **Halcyon**[2] **rufus** (subsp. Celebes) *(1)* Sharpe, Cat. B. XVII, 1892, 221.
j. **Callialcyon coromanda rufa** *(1)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 7; *(2)* iid., ib. 1896, Nr. 2, p. 12.

"Radja udan mera" (Red King of the Crabs), North Celebes, Meyer *e 4.*
"Radja udan mera besar", near Manado, Nat. Coll.
"Bengkah mahamu", Siao, Nat. Coll.
"Sumpotito", Tjamba, S. Celebes, Platen *e 7.*
"Sangkul", Peling, Nat. Coll.
"Pisawato", Karkellang, Talaut, iid.

Figures and descriptions. Sharpe *d I, i 1*; Meyer *h II* (skel.); Wallace *a 1*; W. Blas. *e 7.*

Adult [♂]. General colour rufous, darker above, chestnut-red on the wings and tail; from crown to scapulars, wing-coverts, upper flanks, upper tail-coverts, middle tail-feathers and outer webs of the others, cheeks, ear-coverts and sides of neck washed with magenta, especially strongly on mantle and scapulars; lower back and rump pale silvery blue; under surface orange-rufous, much darker and slightly washed with magenta across the lower throat, forming a sort of ill-defined collar (near Manado, Aug.—Sep. — C 10862). Iris dark-brown; bill, feet, and claws red (M. *e 4*).

Sexes. Similar.

Immature. Like the adult, but with a weaker magenta wash on the upper surface, seen only on hind head and nape, lower mantle, scapulars, upper wing- and tail-coverts; the blue of the rump darker, azure; the feathers of the cheeks, throat and breast terminally fringed with brown, forming wavy cross-bars; bill red (near Manado, Aug. till Sept. — C 10863).

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[1] The genus *Callialcyon* was made by Bonaparte in 1850, Consp. Avium, 156. The type of *Entomothera* of Horsfield (1820), mentioned as *Halcyon coromanda* by Sharpe, is not specified in the original text (Tr. L. S. XIII, 173), and *Ceyx tridactylus*, as the first species of the genus, has the best claim to the name. *Callialcyon* differs notably from *Halcyon* in arrangement of primaries, coloration, shortness of tail.

[2] The genus *Halcyon* was made by Swainson in 1820 (Zool. Illustr. pl. 27; Classif. B. 1837, II, 335). Since writing his "Monograph of the Kingfishers" between 1868—70, it appears that Dr. Sharpe has made a mythological discovery. Swainson conceived Halcyon to be one of the forms of Alcyone's name, Aeolus's daughter, who was changed into a Kingfisher, though Canon Tristram doubts it (Ibis 1893, 215). From his recent Catalogue of the Kingfishers it appears that Dr. Sharpe has found Halcyon to be a person of the male sex, presumably a lover of Alcyone's, though Alcyone has hitherto always been accounted the faithful wife of Ceyx.

Young. Two young specimens — perhaps a fortnight out of the nest, with the hard white points for breaking the egg still left on the tip of the upper bill, are like the adults; in one specimen (? ♂ — C 12583) the magenta wash is more strongly developed than in many adult birds, but a slight shade darker; in the other (? ♀ — C 12581) this colour is less strong than in its fellow of the same age. The blue of the rump a trifle darker in the latter, but both are intermediate between adults with the darkest and palest rumps. Feathers of under surface from chin to middle of abdomen terminally fringed with dusky brown, more broadly than in the older immature bird; bill whitish yellow, in the second specimen dusky horn-colour in places. The shape of the maxilla is noteworthy from the manner in which it overlaps at the tip and is bent down, and the mandible also is peculiar from the keel-shaped prominence along the middle. This calls to mind somewhat the shape of the bill in *Melidora*. The adult bird has no hook and no noteworthy keel. Feet and claws pale brown (Siao — Nat. Coll.).

Observation. In Museum-specimens the bright red of the bill fades in course of years into ochraceous buff, or some still paler tint.

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (Nr. 6179) ad. Manado	114	75	16	49
b. (Nr. 1906) ad. Minahassa	114	71	17	49
c. (Nr. 6181) ad. Manado	118	—	16	49
d. (C 10862) ad. near Manado, VIII.—IX. 92	116	70	16	47.5
e. (C 10864) ad. near Manado, VIII.—IX. 92	115	—	16.5	49.5
f. (C 10863) imm. near Manado, VIII.—IX. 92	114	—	16.5	49
g. (C 10507) ♂ ad. Siao	118	72	16	46
h. (C 12582) ad. Siao, 28. VI. 93	117	74	15	47
i. (C 12581) juv. Siao, 9. VII. 93	91	24	15	21
j. (C 12583) juv. Siao, 23. VI. 93	97	29	16	21
k. (Nr. 6180) ad. Gt. Sangi	115	72	15.5	46
l. (C 13868) ad. Minahassa, 17. XII. 94	114	71	18	48
m. (C 14201) ad. Lembeh Id., 26. II. 95	121	71	17	48
n. (C 14202) vix ad. Lembeh Id., 12. III. 95	126	69	17	43
o. (Sarasin Coll.) ♂ imm. Minahassa, 17. II. 94	126	71	17	49
p. (Sarasin Coll.) ♂ ad. Macassar, XII. 95	121	69	—	50
q. (Sarasin Coll.) ♂ ad. Macassar, XII. 95	118	70	16.5	51
r. (C 14590) ad. Peling Id., V.—VIII. 95	110	68	15	—
s. (C 14591) vix ad. Peling Id., V.—VIII. 95	114	70	16	45.5
t. (C 14592) ad. Peling Id., V.—VIII. 95	115	68	—	48
u. (C 13780) vix ad. Karkellang, Talaut, XI. 94	127	75	16.5	45

Variation. In Celebes the young on leaving the nest has the rich magenta hue of the upper parts as strongly developed as in the adult; the tarsus (as is usual in birds) attains its full length at a much earlier age than the bill, wing and tail.

Immature specimens, as we take them, which are only recognisable by the impure red of the bill — a certain amount of duskiness being present at its base — lose the magenta tint of the young almost completely (it is most pronounced on the tail) and are simple cinnamon-rufous above.

In the adult bird the magenta tint is again developed and is very rich.

The blue tint on the rump varies independently of age in specimens from the

same locality killed at the same date; silvery- or pearl-blue is the commonest colour, but it may be found as deep as azure.

We are not prepared to maintain that the bird varies locally in any part of the province specially treated of in this work. More material from Talaut is, of course, desirable.

Three adults from Borneo of the form conceived by Sharpe as *C. coromanda* (Lath.) are a little smaller than those of Celebes, having wing 105—110 mm; bill 42.5—45. One from Palawan, ♀ scarcely adult, is large, wing 124 mm; bill 48; tarsus 17 (Nr. 12533).

The Bornean race is distinguishable from that of Celebes by the rather darker magenta of the upper surface, and by its slightly smaller size; our immature Palawan bird has no magenta wash above, the under surface ochraceous buff instead of orange-rufous.

Egg of the species. White, 28—29 × 26—27 mm (Nehrkorn MS.).

Egg and breeding habits in Celebes unknown.

Distribution. Celebes, Sula, Sangi and Talaut Islands: — Minahassa (Rosenb. *f 1*, Meyer *e 4*, Guillem. *d 2*, etc.); Lembeh Id. (Nat. Coll.); Gorontalo Distr. (Ros. *f 1*, Meyer *e 4*); Togian Islands (Meyer *e 4*); Macassar (Wallace *e 1*, *i 1*, P. & F. Sarasin); Tjamba, S. Celebes (Platen *e 7*); Peling (Nat. Coll.); Sula Besi and Mangoli (Allen *a 1*, Bernst. & Hoedt *f 1*); Talissi Id. (Hickson *d 3*); Siao (v. Duivenb. *f 1*, Nat. Coll.); Great Sangi (Hoedt *f 1*, Platen *e 9*, Meyer); Karkellang, Talaut (Nat. Coll.).

Without sufficient material from other parts of the range of the species we are obliged to confine our studies to the subspecies of the Celebesian Province. On the variation of the species Dr. Sharpe *(i 1)* makes the following instructive note: "The ordinary form of *H. coromandus* from the Himalayas, Manchuria and Japan is rather pale. The insular forms are darker and richer in colour, especially the one from the Andamans. Specimens from Borneo are rather smaller; but the only race deserving of subspecific separation seems to me to be the bird from Celebes, which Mr. Wallace called *Halcyon rufa*".

The beautiful Kingfisher, *C. coromanda*, appears to be on the whole a stationary species, though probably migratory in the most northern parts of its range. Seebohm writes (B. Japan. Emp. 173): "it is said to be only a summer visitor to Yezzo, but to be a resident in the other islands of the Japanese group". Sharpe *(i 1)* records 16 specimens from Sikkim dated from March to November, but not in the cold season. It appears to be no common bird on the continent of Asia; in India it must be extremely scarce, judging from the remarks of Jerdon quoted by Sharpe *(d I)* and from the circumstance that the volumes of "Stray Feathers" contain no mention of its occurrence, except in Sikkim; in 1874 (II, 494) Mr. Hume was able to compare "some forty Sikkim and Tenasserim birds" with others from the Andamans. Blanford (Faun. Br. Ind. B. III 1895, 135) records it from "the Lower Himalayas up to about 5000 feet, in Eastern Nepal, Sikkim and farther East". Oates says it is one of the rarest Kingfishers in British Burmah; Davison found it "by no means a common species anywhere" in Tenasserim. From China until the last few years no specimen

had been recorded; in "Ibis" 1889, 446; 1891, 484, Mr. Styan was able to refer to a single specimen killed at the mouth of the Yang-tse, and to another from Manchuria now in the British Museum.

Meyer writes that in Celebes it is "generally found in bamboo brushes near rivers, generally several together. It is not a rare bird, but is not to be procured without great patience. In the stomach I found fishes, ants, etc." Davison (S. F. VI, 75) saw it most plentifully in Tenasserim on the coast, though it was also to be met with by inland creeks; in the Andamans Hume (S. F. II, 170) remarked that it affected the gloom of the mangrove swamps, and never visited the clearings or the open coast; in Labuan Whitehead speaks of it as a swamp-loving species, frequenting the beds of Nipa palms near the coast (Ibis, 1890, 20).

Callialcyon coromanda is most likely an ancient form. We agree with Dr. Sharpe in regarding it as the nearest existing *Halcyon*-form having affinity to the red-backed group of *Ceyx*, and it is of some interest to observe that the distribution of that group and of *C. coromanda* is somewhat similar; namely, neither pass into the Australian Region; but *Callialcyon* occurs also in China and Japan, where *Ceyx* does not. The close similarity of the young *Callialcyon* to the adult must not be cited as a token of antiquity; though it is hardly reasonable to regard the slightly differing local races of *Callialcyon* as very ancient, the young nevertheless appear to resemble their parents more closely than they do one another. In other words, the influence of the parents is superimposed upon the ancestral qualities, and obscures them — to what extent we do not know. The young *Callialcyon* described by Sharpe *(i 1)* appears to correspond with a pale race, while our two from Siao seem by comparison as if saturated with a deeper rufous tint below and with magenta above. All, however, agree in having the under parts crossed with wavy lines of dusky brown.

In view of its slight differentiation as a subspecies, it appears hardly possible to regard *C. coromanda rufa* as other than a recent immigrant to the Celebesian Province from some part of the Sunda Islands or Philippines. The next species, *Halcyon pileata*, which has the same distribution, is a much more thorough-going migrant than *C. coromanda* now is. We conceive that this species may have relinquished the habit of migration in comparatively recent times.

+ 89. HALCYON PILEATA (Bodd.).

Black-capped Kingfisher.

a. **Alcedo pileata** *(1)* Bodd., Tabl. Pl. Enl. 1783, p. 41; *(2)* v. Musschenbr., N. T. Ned. Ind. 1876 XXXVI, 377.

b. **Halcyon atricapilla** (Gm. 1788), *(1)* Gould, B. Asia 1860, I, pl. 45; *(2)* Jerd., B. Ind. 1862, 226; *(3)* Hume; Str. F. 1874, II, 168; 1876, IV, 287.

Halcyon pileata *(1)* Sharpe, Monogr. Alcedin. 1868, 169, pl. 62; *(2)* Armstr., Str. F. 1876, IV, 306; *(3)* Hume & Davison, Str. F. 1878, VI, 75, 499; *(4)* Legge, B. Ceylon 1880, 301; *(5)* Vidal, Str. F. 1880, IX, 49; *(6)* Bingh., t. c. 154; *(7)* Butler, t. c. 382; *(8)* Kelham, Ibis 1881, 380; *(9)* Oates, B. Brit. Burmah 1883, II, 83; *(10)* Guillem., P. Z. S. 1885, 548; *(11)* Büttik., Notes Leyd. Mus. 1887, 38; *(12)* Taczan., P. Z. S, 1888, 462; *(12bis)* Hartert, J. f. O. 1889, 365; *(13)* Everett, J. Str. Br. R. A. S. 1889, 160; *(14)* Whitehead, Ibis 1890, 45; *(15)* Steere, List B. Philipp. B. 1890, 11; *(15bis)* Hagen, T. Ned. Aard. Genoots. 1890 (2) VII, 144; *(16)* Styan, Ibis 1891, 317, 325, 483; *(17)* Stejn., Pr. U. S. Nat. Mus. 1891, XIV, 495; *(18)* De La Touche, Ibis 1892, 479; *(19)* Hose, Ibis 1893, 409; *(20)* Styan, t. c. 433; *(21)* Hart., Nov. Zool. 1894, 480; *(22)* Bourns & Worces., B. Menage Exped. 1894, 34; *(23)* Everett, Ibis 1895, 30; *(24)* Blanf., Faun. Br. Ind. B. III, 1895, 133.

c. **Entomobia**[1]) **pileata** *(1)* Cab. & Heine, Mus. Hein. 1860, II, 155; *(2)* Salvad., Cat. Ucc. Borneo 1874, 102; *(3)* Wald., Tr. Z. S. 1875, IX, 154; *(4)* David & Oust., Ois. Chine, 1877, 75; *(5)* Meyer, Ibis 1879, 61; *(6)* Tacz., J. f. O. 1881, 180; *(7)* W. Blas., ib. 1883, 124, 147; *(8)* id., Ornis 1888, 307; *(9)* Vorderman, N. Tdschr. Ned. Ind. 1889, XLIX, 423; *(10)* Salvad., Ann. Mus. Civ. Gen. 1891, 48; *(11)* Tacz., Faun. Orn. Sib. Orient. 1891, I, 192.

d. **Dacelo pileata** *(1)* Schl., Mus. P.-B. Alcedin. 1863, 27; *(II)* id., Vog. Ned. Ind. Ijsv. 1864, 22, 54, pl. IX, fig. 2; *(3)* id., Revue Alcedin. 1874, 18.

e. **Halcyon pileatus** *(1)* Sharpe, Cat. B. XVIII, 1892, 229.

For further synonymy and references see Sharpe *e 1.*

Figures and descriptions. Gould *b I*; Sharpe *I, c 1*; Schlegel *d II*; Hume *3*; Legge *4*; David & Oust. *c 4*; Oates *9*; Taczanowski *c 11*; Blanford *24.*

Adult. Above bright French-blue; entire head, including malar region and nape, and wing-coverts black; chin, throat and a broad collar round the neck white, passing into cinnamon-rufous on lower breast, abdomen, and under tail- and wing-coverts; remiges and tail below black, the primaries for their basal half or more white, forming a broad patch.

Wing 124 mm; tail 80; tarsus 14, bill from nostril 53. (Main, Minahassa, 16. Feb. 1894: Nat. Coll. — C 13241).

"Bill deep red; mouth pale red; eyelids pinkish plumbeous, covered with white feathers, except on the edges where they are black; feet dark red, brownish in front of the tarsus; claws dark horn-colour; iris dark brown" (Oates *9*). Length 280 mm; culmen 61; wing 127; tail 86; tarsus 14 (Sharpe *I, e 1*).

Adult female. Does not differ in colour from the male. Length 280 mm; culmen 61; wing 130; tail 76; tarsus 13 (Sharpe ib.).

Young. Birds of the year have the black of the upper parts and the blue of the back and rump less pure, and the sides of the chest and breast, as also the feathers of the hind-neck collar, marked with crescentic tippings of blackish brown; but in some examples the latter part is striated with brown instead of barred. These crescentic markings appear to remain until the bird is fully aged, as they are present in many specimens which have the upper surface in beautiful adult feather (Legge *4*). Bill shorter, yellow-brown in colour (Styan *16*). Irides bluish grey; legs and feet dark red-brown; soles pale red; bill dark brown, except at extreme tip of lower mandible for about 0.25 in. from tip, the sides and angle of gonys, the gape and one-third of upper mandible from tip gradually coming to a point on ridge of culmen, which

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[1]) *Entomobia* — nomen nudum.

is of a very pale yellowish orange. Length 190 mm; wing 89; tarsus 16; bill 44.5 (Hume & Davis. *3*).

Eggs. 6; a little more oblong than those of *Alcedo ispida*, shell less smooth and less glossy, somewhat rough in certain places; colour pure and transparent white. Average size: 33.6×28.5 mm (Taczanowski *12*).

Nest. A single nest of this species found by Mr. Kalinowski in Corea was formed in the perpendicular sandy wall of a ravine, at a height of 4 meters. Hole like that of *A. ispida*, entrance elliptical, tunnel a meter deep, nearly horizontal and curved, widened and deepened at the bottom, lined with a thick bed of the bones of frogs and lizards, intermingled with the remains of large insects. The nest appeared to have done service for several years (Taczan. *12*).

Abbé David writes *(c 4)*: "Je l'ai trouvé nichant sur un grand arbre des montagnes de Pekin" [?].

Breeding season. Corea, summer (Taczan. *12*); Yangtse, young birds leave the nest in July (Styan *16*).

Distribution. Bengal and the Indian Peninsula (Jerdon *b 2*, Vidal *5*, Butler *7*); Ceylon (Layard *4*); Burmah (Beavan *c 2*, Oates *9*); Tenasserim (Briggs *c 2*, Davison *3*, etc.); Andaman Is. (Beavan *c 2*, Hume *3*, etc.); Nicobar Is. (Hume *3*); Malay Peninsula (Cantor *c 2*, Kelham *8*, etc.): Singapore (Kelham *8*, Davison *e 1*); Sumatra (Kreling *c 2*, Klaesi *11*, Hartert *12bis*, Modigl. *c 10*); Borneo (Wall. *c 2*, Doria & Beccari *c 2*, Everett, etc. *13*); Bunguran, Natuna (Everett *21*); Celebes, Minahassa (v. Musschenbroek *a 2*, *c 5*, *c 7*, Guillem. *10*, Nat. Coll.); Philippines — Balabac and Basilan (Steere *15*), Tawi Tawi (Bourns & Worcester *22*), Balabac (Everett *23*), Palawan (Whitehead *14*, Platen *c 8*); Cambodia (Mouhot *e 1*); Siam (Schomburgk *c 2*, Conrad *c 1*); Cochin China (Day *c 2*, Oustalet *c 4*); Hainan (Styan *20*); China (David *c 4*, Styan *16*, De La Touche *18*); Corea (Kalinowski *12*); Askold Id. (Taczan. *c 6*); Japan — Nipon (Stejneger *17*).

This species, the Black-capped Kingfisher of Indian naturalists, has hitherto been recorded only twice from Celebes, first by van Musschenbroek who states *(a 2)* that one was shot by his son between Manado and Tanahwangko in November, which was sent to the Leyden Museum *(c 5, c 7)*, and again in 1885 it was found near Kema, 20 miles from Manado, by a native hunter left there to collect by Dr. Guillemard, by whom two immature and one adult birds were obtained. Dr. Guillemard has overlooked van Musschenbroek's notice, which is thus confirmed. The Dresden Museum has recently received two further specimens from Celebes obtained the first at Likoupang, 16. Febr. 1894, the other at Manado, 24. March, 1895. This Kingfisher, like *Alcedo ispida*, is a migratory species, and in all probability the Celebesian specimens obtained were winter migrants from East Asia. In proof of this statement we tabulate the following observations:

Corea: "rather common in summer, nests, and leaves the country for the winter" — Taczanowski *12*.

China: "disappears at the end of summer, retiring to Cochin China" — David & Oustalet *c 4*. "Summer visitant to the Lower Yangtse Basin". "Comes annually to breed in the Yangtse Valley" — Styan *16*.

"Not uncommon at Foochow in spring and from the end of August to the beginning of October. It occurs also sparingly in winter" — De La Touche *18*.

Tenasserim: the numbers vary according to the season. "In January and February excessively numerous along the higher portions of the Pakchan; on going over the same part of the river in May, not a single bird was to be seen" — Davison *3*.

Sumatra: during the rainy season (October — January) a very common bird which one hardly ever sees at other seasons — Hagen *15bis*.

Palawan: "a winter migrant, arriving about 23rd Sept." — Whitehead *14*.

In addition to these observations attention should be drawn to the numerous dates of the specimens in the British Museum recorded by Dr. Sharpe *(e 1)* viz: India, 5 specimens, December and January; Burma 8, December, January; Tenasserim, 45, September to April; Malay Peninsula, 25 (some without dates), October to March, but one also in August; S. E. China, 3, January. Only one specimen was known from Ceylon at the time of publication of Legge's great work, "which must have been a straggler driven to the coasts of Ceylon by the northerly winds of December". So, too, only a single specimen is as yet known from Japan, a recent addition to the avifauna of that country *(17)*. The migratory habits of the species serve to explain these occurrences.

It is an interesting question why this species is migratory, while *Callialcyon coromanda*, which has very much the same range, is stationary except in the northern parts of its range. The latter species, as Dr. Sharpe has shown, now appears to be undergoing subdivision into many species or subspecies within itself. At one time, we may suppose, it was a migrant like *H. pileata*, but has gradually become almost completely stationary. *H. pileata* is perhaps beginning to settle down in the same way, as its occurrence in South China in summer and winter and in the Malay Peninsula in winter and summer tends to show. The successful multiplication of the southern residents and their gradual spreading would prove a destructive agent to wandering habits on the part of others of the species.

The long Northern Peninsula of Celebes presents a remarkable boundary to species migrating from East Asia to warmer quarters for the winter. This has already been noticed in the case of several species. It is unusual for migrant Asiatic species to pass beyond this boundary into the Moluccas. Nor is this to be wandered at. The Celebes Sea is shut in like a basin with the long wall of North Celebes for its southern border, and the Sangi chain of islands between Mindanao and the Minahassa on the east. Kingfishers, being heavy birds of strong but nervous flight, heading their way straight, apparently, like a bolt towards a given mark, will be little likely to wander away from the path thus made geographically easy for them. This may explain why *Callialcyon coromonda* is not found east of the Celebesian Province.

The present Kingfisher appears to be omnivorous in its food. David never saw it fishing in China, but found it to be especially partial to beetles *(Cantharidae* and *Mylabridae)*; the nest already noticed, found by Kalinowski in Corea, was bedded with the bones of frogs and lizards; in the Malay Peninsula Kelham, who has seen it dart down with a splash into the water and catch a frog, found that it fed there upon frogs, small fishes, and crabs *(8)*.

+ 90. HALCYON SANCTA Vig. Horsf.

Sacred Kingfisher.

Halcyon sancta *(1)* Vig. & Horsf., Tr. L. S. 1826, XV, 206; *(II)* Gld., B. Austr. 1840, II, pl. 21; *(III)* Diggles, Orn. Austr. 1869, pl. 2, fig. 2; *(IV)* Sharpe, Monogr. Alcedin. 1870, 239, pl. 91; *(5)* Finsch, Journ. Mus. Godef. 1875, VIII, 50; *(6)* Brüggem., Abh. Ver. Bremen 1876, V, 54; *(7)* E. L. & L. C. Layard, Ibis 1882, 503, 543; *(8)* Finsch, Vög. der Südsee 1884, 8, 24 (Mitth. Orn. Ver. Wien 1884, 55, 95); *(9)* Rams., Pr. L. S. N. S. W. 1886, 2. ser. I, 1086; *(10)* id., Tab. List Austr. B. 1888, 3; *(11)* Cox & Hamil., ib. 1889, IV, 401; *(12)* North, Nests & Eggs B. Austr. 1889, 37; *(13)* Everett, J. Str. Br. R. A. S. 1889, 161; *(14)* Wiglesw., Aves Polyn. 1891, 13; *(15)* Sharpe, Cat. B. XVII, 1892, 267; *(16)* M. & Wg., J. f. O. 1894, 242 partim; *(17)* Madarasz, Aquila 1894, 99; *(18)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 2, p. 12; *(19)* Hart., Nov. Zool. 1896, 551, 571, 595.

a. **Todirhamphus sanctus** *(1)* Bp., Consp. 1850, I, 156; *(II)* Reichb., Hb., Alcedin. 1851, 33, t. 418 fig. 3131—33; *(3)* Wall., P. Z. S. 1862, 338; *(4)* Gld., Hb. B. Austr. 1865, I, 128.

b. **Sauropatis sancta** *(1)* Cab. & Heine, Mus. Hein. 1860, II, 158; *(2)* Wald., Tr. Z. S. 1872, VIII, 44; *(3)* Salvad., Cat. Ucc. Borneo 1874, 104; *(4)* Meyer, Ibis 1879, 62, 145; *(5)* Salvad., Orn. Pap. 1880, I, 476; *(6)* Meyer, Isis, Dresden 1884, 6; *(8)* Gnillem., P. Z. S. 1885, 548, 568, 627; *(9)* W. Blas., Ornis 1888, 575; *(10)* Salvad., Orn. Pap. Agg. 1889, I, 58; *(11)* Vorderman, N. Tdschr. Ned. Ind. 1891, 440; *(12)* id., Notes Leyden Mus. 1891, 124.

c. **Dacelo sancta** *(1)* Schl., Mus. P.-B. Alcedin. 1863, 35; *(II)* id., Vog. Ned. Ind. Alcedin. 1864, 27, 59, pl. X, f. 1; *(3)* id., Revue Alcedin. 1874, 26.

"Dadubatang bahewa", Karkellang, Talaut.

"Saika anej", Kabruang, Talaut.

"Bengka budia", Great Sangi.

"Sisakomang kadio", Siao.

"Bengka", Tagulandang and Biarro.

"Kiskis posiposi", Manado tua.

"Tengkesi ise ise", Tonkean, E. Celebes.

"Tengkesi mosoni", Banggai.

The above native names have all been communicated to us by our native hunters there.

For further synonymy and references see Salvadori *b 5*, *b 10*; Sharpe *15*.

Figures and descriptions. Gould *II*; Reichb. *a II*; Schlegel *c II*; Diggles *III*; Sharpe *IV*, *15*; Salvad. *b 5*; Ramsay *9*; North *12* (egg).

Adult. Head above, mantle and scapulars bluish sage-green, shading off on the sides of the occiput into verditer-blue, the colour of the back, rump and upper tail-coverts; wing-coverts, quills and tail duller blue, inner webs and ends of quills

blackish; lores orange-rufous; under surface and a broad collar around hind neck white, pure on chin and throat, washed with orange-rufous on the other parts, most intensely on the collar, flanks and abdomen; malar stripe, ear-coverts, continuously with a broad line around neck bordering the blue-green of the head, blackish; upper edge of mantle blackish; on sides of neck and breast some faint dusky bars (probably remains of immature plumage) (Siao, 15. VI. 93 — C 12612). Iris brown; tarsus dull green; bill black, basal half of lower mandible white (Guillem. *b 8*).

Young. Like the adult, but duller in colour; breast and collar barred with dusky; wing-coverts margined with pale fawn-colour; lores and margins of feathers of forehead pale cinnamon (Great Sangi, 22. VII. 93 — C 12708).

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (Nr. 8177) ♂ ad. Kalindong, N. E. Celebes, April 1871	90	56	11.5	32
b. (C 12612) ad. Siao, 15. VI. 93	86	55	11.5	33.5
c. (C 12613) juv. Siao, 3. VII. 93	89	55	—	—
d. (C 12708) juv. Gr. Sangi, 22. VII. 93	93	60	12.5	33.5
e. (Nr. 8174) imm. Gr. Sangi	89	56	—	32.5
f. (Mus. Berol.) ♂ ad. Togian Is. Aug. 71	90	61	12.5	34.5
g. (Mus. Berol.) ♀ ad. Togian Is. Aug. 71	89	55	—	31
h. (C 13090) imm. Kabruang, 2. XI. 93	96	59	—	38.5

Other specimens are dated: 3 Siao — June till July; 1 Sangi — July (Nat. Coll.); Tagulandang and Biarro — September; Manado tua — May; Talaut — autumn; E. Celebes and Banggai — May to August.

Eggs. Usually 5; pearly white; average of five measured 26.2×22.1 mm (North *12*), 25×21.5 mm (Nehrkorn MS.).

Nest. In Australia — eggs deposited on the decaying wood in a hollow branch, or hole of a tree, usually an *Eucalyptus* (North *12*), the hollow spouts of the gum — and boles of the apple-trees *(Angophorae)* generally selected (Gld. *II, a 4*); usually a hole 12 to 18 inches long dug in the arborial nest of white Ants (Ramsay *IV*); in New Caledonia — nests in holes, sometimes dug by itself in banks, or in hollow trees, often at a considerable altitude from the ground (Layard 7).

Breeding season. Australia — commences in October and lasts till December (Gld. *a 4*), commences in September (North *12*), eggs to be had from the beginning of October to November 20th in the Mudgee District, N. S. W. (Cox & Hamilton *11*); New Caledonia — nesting season from November to January (Layard 7).

Distribution. All parts of Australia and Tasmania (E. P. Ramsay *10*, etc.); Islands of Torres Straits *(b 5)*; Norfolk Island (Gray *b 5*, Lay. 7)[1]; New Caledonia, Loyalty Islands, and New Hebrides (Lay. etc. *14*); ? Tonga Islands — Vavao (Verr. *c 3*, *14*); Pelew Islands (Semper *5*); Papuasia from the Solomon Is. and New Ireland to New Guinea, Waigiou, Aru, Kei (Salvad. *b 5*); the Moluccas from Banda, Ceram and Buru to Halmahera (Salvad. *b 5*); Sula Islands (Allen *a 3*, Hoedt *c 3*); Togian Islands (Meyer *b 4*); Celebes — Macassar (Wall. *b 2*, *15*); Gorontalo (Rosenb. *c 3*); Minahassa (Meyer *b 4*, Guillem. *b 8*); Manado tua, Biarro and Tagulandang (Nat. Coll.); Sangi Is. — Siao (v. Duivenb. *c 3*, *b 9*, Nat. Coll. in Dresd. Mus.); Great Sangi (Platen *b 9*, Nat. Coll. in Dresd. Mus.); Karkellang and Kabruang — Talaut

[1]) According to Sharpe the species inhabiting Lord Howe's Island and Norfolk Island is *H. vagans*.

Is. (Nat. Coll. in Dresd. and Tring Mus.); South Borneo *(b 3, 13)*; S. E. Sumatra (E. C. Buxton *15*); Banka (Vosmaer *c 3*); Billiton (Vorderman *b 11*, *b 12*, Walter *15*); Mendanao, near Billiton — NB. not Mindanao (Vorderman *b 12*); Java, Lombok, Timor, Timorlaut (Salvad. *b 5*, *b 10*); Bali and Sumbawa (Doherty *19*).

This Kingfisher is, very probably — if not a migrant to Celebes — increased in numbers by migration to the country during the Australian winter, though it occurs in the Province throughout the year. Few specimens have been obtained on the mainland of the island; in 1874 there was only one example from Celebes in the Leyden Museum, viz. from Gorontalo, and we can only find notice of one specimen from South Celebes, shot by Mr. Wallace near Macassar. Meyer met with it only at Kalinaong in the N. E. Minahassa and gained the impression that it is a rare bird. The only other ornithologist who has recorded it from Celebes appears to be Dr. Guillemard, who obtained a female specimen at Manado, but we have several from our native hunters labelled Tonkean, E. Celebes. It seems to be more common on the smaller islands. In June and July our hunters seem to have found it rather plentiful in Siao, but less so in Great Sangi in July, judging from the proportion of specimens recently sent to the Dresden Museum. Prof. W. Blasius records four young specimens killed by Dr. Platen's hunters on Great Sangi in July and August, and we have examined a number of specimens from Talaut, Tagulandang, Banggai, etc.

In Australia it is known to be a migrant form, though here, as in the tropical parts of its range, a few seem always to be met with. Thus Gould writes *(a 4)*: "It is a summer resident in New South Wales and throughout the southern portion of the continent, retiring northwards after the breeding-season. It begins to disappear in December, and by the end of January few are to be seen: solitary individuals may however be met with even in the depth of winter. They return again in spring, commencing in August, and by the middle of September are plentifully dispersed over all parts of the country". In the Mudgee District Cox & Hamilton observe that it arrives early in September, and it has been noticed there as late as March 1st. Dr. Sharpe records one from North Australia in July, where we suppose it is always present.

In the East Indies — except the S. E. parts — the great majority of properly dated specimens in collections have been obtained when the species is away from the southern parts of Australia, i. e. between March and the end of September, though here and there individuals killed at other times of the year are recorded, showing that the migration to the South east and to Australia is not thorough.

Thus Schlegel records a specimen from Sula, 27th November, and Count Salvadori one from Halmahera, December, and specimens were obtained by our hunters in Talaut in November.

This bird, like others, sometimes goes astray in its migrations. During

Dr. Finsch's cruise in the South Seas a specimen flew on board in 15° S. by 157° E. "The nearest land 300 sea-miles to the north-west was South-east Id. of the Louisiade Group, to the north-east, circa 330 sea-miles, Rennell Id. of the Solomon Group, due west we lay 690 sea-miles from the coast of Australia and east 570 miles from Esperitu Santo in the New Hebrides. This most remarkable and certainly very rare case of flying astray on the part of a bird fitted apparently with such moderate powers of flight calls for so much the more wonder, as we had had very unsettled weather on the preceding days, with heavy storm and squalls from north-west to north-east in all directions of the compass" *(8)*.

In view, perhaps, of the migratory habits of the species Count Salvadori has accepted the localities Tonga Islands and Pelew Islands without query; we question the first, since it rests only upon the evidence of that unreliable authority, Verreaux, and, as to the second, Finsch is of opinion that Semper's label recording a specimen from the Pelew Islands may be erroneous, since the species was not obtained there by Kubary during his 1½ years' collecting in the islands *(5)*, but, after having made inquiries, we have found out that Semper collected birds only on the Pelew Islands and not on the Philippines and that there is no reason whatever to doubt that locality. The birds in question may have been stragglers to these localities.

Notwithstanding the amount of collecting done of late years in North Borneo by Everett, Whitehead and others, this species has only been obtained in the south of the island. We infer that the bird reaches this part of Borneo from the chain of islands running from Sumatra to Timor and Timorlaut. In West Australia birds apparently differ from those of East Australia, but in what way we cannot say, for Gould *(a 4)* says the former are "a trifle larger in all their measurements; but otherwise present no differences of sufficient importance to warrant their being considered as distinct"; whereas Dr. E. P. Ramsay *(9)* says they are "slightly smaller and of a clearer blue on the back than our N. S. W. specimens, with a narrow, well-defined white collar and nuchal spot. Wing 93 mm, bill from nostril 38, total length 178". From these measurements it would appear that the word "smaller" may be a *lapsus calami*, "larger" being intended. As in the case of *Merops ornatus*, we suspect — should differences be proven — that specimens from Sumatra to Timor and S. Borneo will be found to have more in common with West Australian than with East Australian, Papuan, Moluccan and Sangi birds, and that the former migrate across the Timor Sea, the latter across Torres Straits; but this opinion we utter with all reserve.

The haunts of this Kingfisher are very varied: "the most thickly wooded brushes, the mangrove forests which border, in many parts, the armlets of the sea, and the more open and thinly timbered plains of the interior, often in the most dry and arid situations far distant from water" (Gould *a 4*).

Its food is similarly various; Gould speaks of *mantes*, grasshoppers, caterpillars, lizards, and very small snakes; E. P. Ramsay *(IV)*, and Cox & Hamilton *(11)*, unlike Gould, have seen it plunge into the water also and take fish.

A very near ally of this species is *H. vagans* of New Zealand, which Dr. Sharpe speaks of as "a large and richly coloured island race of *H. sanctus*". Another closely related form is *H. chloris*, the next species on our list, from which, as Salvadori remarks, it is easily distinguishable by its much smaller dimensions, and by the fulvous colour of the cervical collar, and of the under parts *(b 5)*.

91. HALCYON CHLORIS (Bodd.).

White-collared Kingfisher.

This plentiful species is distributed from the coasts of the Red Sea and India south and east as far as the Pelew Islands, the Solomon Islands, the New Britain Group, and perhaps even the Fiji Islands. According to Dr. R. B. Sharpe's recent researches (Cat. B. XVII, 1892, 272—283), a tendency to become differentiated into local forms finds expression in many different localities within this vast range, yet the differences are such that — locality unknown — it is certain that an adult specimen could not be determined as this or that form by means of a description alone, to say nothing of younger specimens. Moreover, "here and there", as Dr. Sharpe says, "is to be found a specimen which seems to be intermediate between the races; and as several of the latter appear to be migratory, it is quite possible that some of them hybridize with the resident birds of the countries which they visit". Instead, therefore, of treating these supposed races as being several distinct species and subspecies, as Sharpe has done, we cannot help thinking that the whole should have been viewed as one species, *H. chloris*, which perhaps branches out into numerous subspecies. Working ornithologists are well aware that it is much easier to make a new species than to "kill" an old one — especially so long as the author of it is living — and most inconvenient in this way are species which are entitled only to rank as possible subspecies Naturalists either entirely admit their validity as species or entirely ignore them, and the result is confusion and mutual disrespect for the other's judgment. Would the former only consent to attach a trinomial or some other token to indicate that the variation in the species comes to a particular head there, this stumbling-block would be done away; it would then become understood that he who employs the simple binomial speaks broadly of the species as a whole, while he who employs some special additional sign refers thereby to some particular section of the species. That the best way to do this latter is to employ the tri-, quadri-, quinqui-, etc.-nomials suggested by American ornithologists we do not believe: when the need for it becomes sufficiently pressing, it is to be hoped that some much briefer, simpler method will be found.

We have paid great attention to this species and have before us at this moment a series of 80 skins from the Celebesian area alone, not to speak of a great number of others which have passed through our hands in the last few years, yet we do not feel able to say anything about it, except that it varies individually in the same localities to a very great extent, both in size, in the size and form of the bill, in the different shades of blue and green of the upper surface, and in the presence or absence of bars on the under surface; moreover, as soon as the bird can fly, it wears the adult dress and even experienced ornithologists might take such, before they are full grown, for a smaller species or subspecies.

+ The typical Halcyon chloris.

a. **Alcedo chloris** *(1)* Bodd., Tabl. Pl. Enl. 1873, p. 49; *(2)* Rosenb., Malay. Archip. 1878, 272.

b. **Alcedo collaris** (Scop.), *(I)* Kittl., Kupfert. Vög. 1833, I, 10, pl. 14, fig. 1.

c. **Halcyon collaris** *(1)* Swains., Zool. Illustr. 1820, I, pl. 27.

d. **Halcyon chloris** *(1)* Gray, Gen. B. 1846, I, 79; *(II)* Sharpe, Monogr. Alcedin. 1870, 229, pl. 87; *(3)* Hume & Davison, Str. F. 1873, I, 451; *(4)* Brüggem., Abh. Ver. Bremen 1876, V, 53; *(5)* Lenz, J. f. O. 1877, 367; *(6)* Sharpe, P. Z. S. 1879, 332; *(7)* Everett, J. Str. Br. R. A. S. 1889, 161; *(8)* Whitehead, Ibis 1890, 45; *(9)* Steere, List Coll. B. Philipp. Is. 1890, 11; *(X)* Sharpe, Cat. B. XVII, 1892, 273, pl. VII, fig. 3; *(11)* Bütt., Zool. Erg. Weber's Reise in Ost-Ind. 1893, III, 275; *(12)* M. & Wg., J. f. O. 1894, 242; *(13)* Studer, Gazelle-Reise 1889, III, 198; *(14)* Hartert, Ornis 1891, 121; *(15)* Bourns & Worces, B. Menage Exp. 1894, 34; *(16)* Vorderm., N. T. Ned. Ind. 1895, LIV, 335; *(17)* Hart., Nov. Zool. 1895, 474; *(18)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 7; *(19)* iid., ib. Nr. 9, p. 3; *(20)* iid., ib. 1896, Nr. 1, p. 8; *(21)* iid., ib. Nr. 2, p. 12; *(22)* Büttik., Notes Leyden Mus. 1896, XVIII, 172; *(23)* Hart., Nov. Zool. 1896, 158, 175, 562, 571, 586, 595; *(24)* id., ib. 1897, 158; *(XXV)* Meyer, Vogelskel. 1897, pl. CCXVI.

e. **Halcyon forsteni** *(1)* Bp., Consp. 1850, 157 (ex Temm. MS.); *(2)* Gray, HL. 1869, I, 93; *(III)* Sharpe, Monogr. Alcedin. 1870, 235, pl. 89; *(4)* id., Cat. B. XVII, 1892, 279.

f. **Todiramphus forsteni** *(1)* Reichb., Hb. spec. Orn., Alcedin. 1851, 30.

g. **Cyanalcyon forsteni** *(1)* Bp., Consp. Vol. Anisod. 1854, 9, Nr. 313.

h. **Dacelo forsteni** *(1)* Schl., Mus. P.-B. Alced. 1863, 37; *(II)* id., Vog. Ned. Ind. Alced. 1864, 29, 60, pl. XI, f. 1; *(3)* Finsch, Neu Guinea 1865, 161.

i. **Sauropatis forsteni** *(1)* Wald., Tr. Z. S. 1872, VIII, 44; *(2)* Meyer, Ibis 1879, 62.

j. **Todiramphus collaris** *(1)* Wall., P. Z. S. 1862, 338.

k. **Sauropatis chloris** *(1)* Cab. & Heine, Mus. Hein. 1860, II, 160; *(2)* Wald., Tr. Z. S. 1872, VIII, 44; *(3)* Salvad., Cat. Ucc. Borneo 1874, 103; *(4)* id., Ann. Mus. Civ. Gen. 1875, VII, 653; 1876, IX, 53; *(5)* Meyer, Ibis 1879, 61, 146; *(6)* Salvad., Orn. Pap. 1880, I, 470; *(7)* W. Blas., J. f. O. 1883, 135; *(8)* Kutter, ib. 1882, 171; 1883, 301; *(9)* Meyer, Isis, Dresden 1884, 6, 19; *(10)* Guillem., P. Z. S. 1885, 256, 504, 547, 568; *(11)* W. Blas., Ztschr. ges. Orn. 1885, 244; 1886, 90; *(12)* id., Ornis 1888, 307, 573; *(13)* Salvad., Orn. Pap., Agg. 1889, I, 57; *(14)* Hickson, Nat. in N. Celebes 1889, 90.

l. **Dacelo chloris** *(1)* Schl., Mus. P.-B. Alcedin. 1863, 32; *(II)* id., Vog. Ned. Ind. Alcedin. 1864, 26, 58, pl. X, f. 3, 4; *(3)* id., Rev. Acc. 1874, 21.

m. **Halcyon meyeri** subsp. *(1)* Sharpe, Cat. B. XVII, 1893, 282.
n. **Halcyon sancta** (nec Vig. & Horsf.) *(1)* M. & Wg., J. f. O. 1894, 242, pt.; *(2)* iid., Abh. Mus. Dresden 1895, Nr. 9, p. 3.

"Saika", Talaut, Nat. Coll.
"Bengka ngake", Great Sangi, iid.
"Sisakomang", Siao, iid.
"Sisakomang koke", Siao, immature, iid.
"Radja udan biru", (Blue King of the Crabs), Malay name, Minahassa, Meyer *k 5.*
"Kikiskatanaän", Alfurous, Minahassa, M. *k 5.*
"Kiskis", Minahassa and the islands off the coast, Nat. Coll.
"Kiss-kiss", Talissi, Hickson *k 14.*
"Doö", Gorontalo?, v. Rosenberg *a 2.*
"Tjiki", Tjamba, Macassar, and Maros, S. Celebes, Platen *k 11.*

For further synonymy and references compare Salvadori *k 6*, *k 13* and Sharpe *d X.*

Figures and descriptions. Kittlitz *b I*; Swainson *c I*; Sharpe *d II*, *d X*, *e III*, *e 4*; Meyer *d XXV* (skeleton); Schlegel *l II*; Hume *d 3*; Brüggemann *d 4*; Salvadori *k 6*; W. Blasius *k 11*; Schlegel *h II (H. forsteni).*

Fürbringer (Untersuchungen 1888, pl. III, fg. 250, pl. IV, fg. 37) has figured some parts of the skeleton.

Adult. General colour above greenish blue, becoming more cerulean on sides of head and nape, wing-coverts, quills, and tail; lores fulvous white; subloral region, ear-coverts, continuously with a narrow band round neck, black, on the ear-coverts washed with blue; entire under surface, a broad collar and a very small nuchal mark above the black band white (N. Celebes, C 3618).

The white nuchal spot is not noticeable in most specimens.

Iris brownish; bill black, below reddish white (M. *f 5*). Iris brown; bill black, basal half of under bill yellow-white; feet black (Platen *f 11*).

Sexes. Similar in colour (Sharpe *d X*).

Young. Similar to the adult in coloration, recognisable as young by the small bill — in this specimen further by the wing and tail not yet full grown. The bill is short (from nostril 29 mm), the extreme tip white, and decurved, it is also less broad, width where the first submalar feathers sprout 15 mm, as against 17.5 in an adult. This specimen is of a strong green tint above and slightly barred below; those described by Brüggemann below are of a fine blue colour above, and not barred below (♂ juv. Macassar, 11. IX. 95: P. & F. Sarasin).

Two specimens. "Bill almost as broad as in the adult, but only 28 mm long, dark horn-grey, the tips of both mandibles white. Upper mandible strongly hooked, also the tip of the under mandible somewhat turned downwards. Feathers of the head still entirely enclosed in the silver-white sheaths. So too on the back, the wings, and under surface many sheaths are still noticeable. Wing 79 mm. Above fine blue. Below pure white, in one specimen with slight traces of blackish borders on the feathers of the breast" (Brüggem. *d 4*).

Brüggemann rightly remarks that the form of bill in the young bird is of special interest and fully confirms the views to which Sharpe has given utterance in his excellent review of the genetic affinities of the Kingfishers.

The young vary in tint from bright China-blue to verdigris-green, just as do the adults. We believe a white nuchal spot is always present, though it is often completely concealed and probably often not seen in life. There is often nothing to distinguish the young but their smaller bill, and just this point is likely to lead them

to be taken for a smaller race. For a long time we took a small series of specimens from Talaut for a race of the small *H. sancta (n 1, n 2)*, then with an increased series of about 25 specimens we labelled it with a ? "small race of *chloris*"; finally, having studied the young and found every possibly transition between specimens with bills of 30 to adults with bills 47 mm in length, it appears obvious that the small specimens are simply young ones which have not yet attained their full size.

Measurements.	Wing	Tail	Bill from nostril	Tarsus
North Celebes, 10 adults	105-114	66 c.	33.5-40.5	13 c.
North Celebes, 2 imm.	104, 105	65, 68	33.5-38	—
S. Cel., Tanette, 1 ad., Sept., Maros, ♀ ad., Nov. 1871	109-114	62-65	35, 35	—
Manado tua and Mantehage Is., 4 imm., April 1893	108-112	65 c.	33.5-41	—
Banka Id. off the Minahassa, 2 ad., May 1893	105, 106	63, 70	37.5-42.5	—
Siao, 1 ad., June 1893	114	68	40	—
Siao, 2 imm., June 1893	104, 105	62, 64	34, 36	—
Great Sangi, 3 ad., July 1893	104-111	68-69	37-41	—
Togian Is., ♂ ad., ♀ ad., August 1871	103, 106	65, 65	37, 37	—
Talaut Is., Kabruang, 6 ad., Salibabu, 2 ad., Oct.-Nov. 93	110-118	68-75	43-46	—
Talaut Is., Kabruang, 4 imm., Nov. 1893	108-113	66-73	38-43	—
East Celebes, Peling and Banggai — 33 examples	102-119	—	36-47	—
Young and immature specimens.				
Karkellang, 12, Kabruang, 1, late autumn 93, 94, 96	90-104	54-65	30-38	13 c.
E. Celebes and Peling, 5 juv., May—August 1896	101-105	—	34-37	—

Eggs. Mindanao: 4 in number; 28.7—31.2 × 23.1—24.0 mm; pure white, smooth, glossy, short oval, or somewhat ovate, fine-grained with pores only slightly indicated (Kutter *k 8*); Labuan: 3, pure white; 29.2—30.5 × 24.1—25.4 (Sharpe *d 6*).

Nest. In holes in trees, or in a termites' nest (Kutter *k 8*). The Sarasin Collection contains a fragment of the rotten stem of a tree with a hole of about 45 mm diam. through it, apparently pecked out by the bird, and the lining of the nest, consisting only of a small quantity of vegetable fibres and grasses (Tomohon, orig. label lost).

Breeding season. Mindanao, March and April (Kutter); Labuan, nest found March 22nd (Low *d 6*).

Distribution. In the Celebes Province: — Talaut Is. (Nat. Coll. Dresden & Tring Museums) Great Sangi (Bruijn *k 4*, Platen *k 12*, Nat. Coll.); Siao (Hoedt *l 3*, v. Duivenb. *l 3*: Nat. Coll.); Tagulandang, Ruang (Nat. Coll.); Talissi (Hicks. *k 14*); Banka, Mantehage, Manado tua and Lembeh (Nat. Coll.); Minahassa (Meyer *k 5*, etc.); Gorontalo (Rosenb. *l 3*, etc.); Togian Is. (Meyer *k 5*, *m 1*); E. Celebes (Nat. Coll.); Kandari, S. E. Peninsula (Beccari *k 4*); South Peninsula (Wall. *k 2*, Platen *k 11*, Meyer *k 5*, Weber *d 11*); Peling and Banggai (Nat. Coll.); Sula Islands — Sula Besi (Wall. *j 1*, Berust. *l 3*).

As is commonly supposed to be the case with excessively numerous species, this Kingfisher is subject to very considerable individual variation — for a Kingfisher indeed, in which family the species are very stable, the individual variation of *H. chloris* may be termed great. A couple of hundred specimens or more of this species from the Celebesian area have passed through our hands in

the last few years and it has on several occasions received close attention from us. The result is, as already indicated, that we are unable to point to a single local race or subspecies; if local variation exists, it is entirely swamped by the individual variation, and the racial development could only be ascertained by long investigation on hundreds of specimens and by so determining the average individual of this or that spot. Some of the more prominent points of variation in the Celebesian area are: the bill-length from 30 mm (young—but not appearing so) to 47 mm, its width noticeably different, the culmen sometimes slightly recurved; the white nuchal spot, sometimes large, sometimes present only on the basal part of the feathers and concealed, the tips being blue; the colour of the ear-coverts — blackish, or strongly washed with blue or green; the colour of the upper surface varying, as already pointed out, from bright China-blue to verdigris-green. At one time we thought the Talaut race ran larger in size and in size of bill than in Celebes, a larger series has, however, shown that this is not the case; at another time we thought that Talaut possessed two races — a large and a small one, but later investigations simply go to prove that the small one is young and not full-grown. Dr. Sharpe has broken up *H. chloris* into many species and subspecies: were his views to be adopted, not only *H. chloris*, but also *H. armstrongi* Sh., *H. forsteni* Bp., *H. solomonis* Salvad., *H. humii* Sh., *H. meyeri* Sh. and perhaps others would apparently have to be admitted into this work — all from the Celebesian region. *H. humii* we hold simply for young, *H. armstrongi*, *H. solomonis*, and *H. forsteni* for individual variations.

In some of the Moluccas Dr. Sharpe finds that specimens with black ear-coverts joining a very broad black nape-band are prevalent, but does not find it possible to draw a line of division between them and others from the same or neighbouring islands. Most of the Moluccan examples in the Dresden Museum have a slight wash of blue on the ear-coverts: on the contrary those of Timorlaut are without colour on this part, being simply black.

In Malacca, Sumatra, and Borneo there can be no doubt that *the typical chloris* intergrades with *H. armstrongi* of the Burmese countries; Sharpe records both forms from the two latter localities, and there is no reason to believe that they separate themselves at a given season by migration.

Again, in Acheen, Sumatra, Dr. Sharpe records both *the typical chloris* and *H. humii* of the Malay Peninsula and Siam at the same date.

Count Salvadori questions the identity of specimens from the Pelew Islands with *H. chloris*; a specimen from there in the Dresden Museum is remarkably green on the head, mantle and scapulars, but not more so than one from Timorlaut, where much bluer specimens also occur.

We unite *Halcyon forsteni* with this form of *H. chloris*, believing, like Count Salvadori *(k 6)*, that it is only a melanotic variety of it. The feathers of the under surface of the type of *forsteni* which we have seen, are muddled with

greenish black, not regularly barred as shown in Sharpe's *(e III)* figure of it. The head, back, and scapulars of this specimen are very green. It is worthy of note that those specimens from the Celebes Province which are greenest above most usually have the breast barred with dusky, while those of the bluest upper surface are generally pure white below.

Sharpe has separated the two specimens from the Togian Islands in the British Museum as *H. meyeri*, a subspecies of *H. humii*, on the ground of their possessing black ear-coverts and nuchal collar, a wash of fulvous on the sides of the body, and the bill upturned at the tip in a very conspicuous manner. After examining the two specimens from Togian (Meyer) in the Berlin Museum, kindly forwarded to us for the purpose by Prof. Reichenow, we find ourselves unable to admit the racial distinction of Togian birds; the bill in these two examples does not incline upward more than in many specimens from the mainland of Celebes, the ear-coverts of the female are blue, of the male washed with blue, the sides are indeed slightly fulvous, but this is also seen in some Celebesian specimens. The blue of the upper surface does not differ from that of some specimens from Celebes. Whether the greener-backed birds also occur in Togian, as they do in Great Sangi, Talaut and elsewhere, remains to be ascertained. *H. chloris* in the East Indies may be compared to the Sparrow in Europe, so far as variation is concerned.

GENUS MONACHALCYON Rchb.

These Kingfishers are of rather large size, and may be recognised by their having the tarsus as long as the middle toe without the claw; the 4th and 5th primaries are longest, the 1st shorter than the secondaries; the bill is red, conical, deeper than wide across the nostril, the length from the nostril less than 3 times the width; the tail is long, about 3 times the length of the bill from the nostril, rounded. The typical forms of Celebes are forest-haunting birds. Four species, one in Flores.

* 92. MONACHALCYON MONACHUS (Bp.).

Blue-cowled Kingfisher.

The typical form of this species inhabits the Northern Peninsula of Celebes and has a China-blue head. In the Eastern Peninsula a form with a black head occurs. From Western Celebes Mr. Hartert has described a bird which is treated by him as a subspecies of the typical form, but further proof is required before the very different black-headed *M. capucinus* can be brought in as a third subspecies. The young of the typical *monachus* is known to be like the adult; the young of *M. capucinus* is not known.

† 1. The typical Monachalcyon monachus.

a. [**Dacelo princeps** Forsten in lit.].

b. **Halcyon monachus** [*(1)* Gray, Gen. B. I, 1846, 79, pt. (descr. null.)]; *(2)* Bp., Consp. 1850, I, 154; *(3)* Cass., Cat. Halc. Philad. Mus. 1852, 8; *(4)* Wall., Ibis 1860, 142; *(5)* Brüggem., Abh. Ver. Bremen 1876, V, 50.

c. **Dacelo monachus** [*(1)* Gray, List Fissirostr. Br. Mus. 1848, 53, pt. (descr. null.)]; *(2)* Blyth, Cat. B. Mus. As. Soc. 1849, 46.

d. **Monachalcyon princeps** *(1)* Wald., Tr. Z. S. 1872, VIII, 43; *(2)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 653, pt.; *(3)* Meyer, Ibis 1879, 60; *(4)* Salvad., Orn. Pap. 1880, I, 503; *(5)* W. Blas., J. f. O. 1883, 135.

e. **Halcyon princeps** *(1)* Cass., Cat. Halc. Philad. Mus. 1852, 8.

f. **Paralcyon princeps** *(1)* Bp., Consp. Vol. Anisod. 1854, 9.

g. **Dacelo princeps** pt. *(1)* Schl., Mus. P.-B. Alced. 1863, 24, pt.; *(II)* id., Vog. Ned. Ind. Alced. 1864, 20, 53, pl. 7, fig. 1, 2 (only); *(3)* Gray, HL. 1869, I, 89; *(4)* Schl., Revue Alced. 1874, 16.

Monachalcyon monachus *(I)* Sharpe, Monogr. Alced. 1870, 255, pl. 98, figs. 1, 2 (only); *(2)* Lenz, J. f. O. 1877, 367; *(3)* Reichnw., J. f. O. 1883, 122; *(4)* Guill.. P. Z. S. 1885, 547, pt.; *(5)* Tristr., Cat. Coll. B. 1889, 94; *(6)* Heine & Rchnw., Nomencl. Mus. Hein. 1890, 168; *(7)* Sharpe, Cat. B. XVII, 1892, 294; *(8)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 2, 13; *(9)* Hart., Nov. Zool. 1896, 562.

h. **Actenoides hombroni** *(1)* Reichnw. (nec Bp.)., J. f. O. 1877, 218.

i. **Monachalcyon monachus monachus** *(1)* Hart., Nov. Zool. 1897, 163.

"Radja udan kapala biru" (King of the crabs with blue head), Minahassa, Malay, Meyer *d 3*, Nat. Coll.

"Kikis tambo", Minahassa, Alfurous, Meyer *d 3.*

Figures and descriptions. Sharpe *I, 7*; Schlegel *g II, g 1*; Brüggemann *b 5.*

Adult male. General colour above green-olive, tail, upper tail-coverts and outer webs of primaries washed with verditer-blue; entire head, including ear-coverts and malar region, dark China-blue, paler on sides; chin and throat white; remaining under parts orange-cinnamon-rufous, continuous with a narrow collar round neck darker and redder, scarcely meeting behind; under wing-coverts pale buffy cinnamon. Bill red (near Manado, Aug.—Sept., C 10860, March, Nr. 6148).

Young [male]. Two specimens, about a fortnight out of the nest, are just like the adult male, but with the breast crossed with wavy lines of dusky; the lores and forehead touched with cinnamon; bill short, tip a little bent down, horn-brown, yellowish in places, especially towards tip (Manado tua Id., 8. IV. 93, C 12257, Lotta, Minahassa, 14. IV. 93, C 12256).

Female. Like the adult male, but with only the upper part of head blue — malar region, ear-coverts, sub- and supra-orbital region, lores, and bases of feathers of forehead, cinnamon-rufous like the under surface, but darker except above the eye; chin and throat wood-brown (Manado, March, C 2286). Three other specimens, marked female (C 2285, Nr. 6152, 6151) have a greater or less amount of greyish blue on the malar region, ear-coverts and under the eye.

Observation. From the circumstance that the specimen (Nr. 6151) with most blue on the sides has a somewhat shorter and more immature-looking bill, we believe that the young female will be found to resemble the male, having the entire sides of the head blue, but that in the adult female these parts gradually become cinnamon-rufous, whereas the old male hardly differs from the young. Brüggemann *(b 5)*

was certainly in error in stating that this species appears in two different dresses according to the season, the first dress described being that of the adult male, the second of the female. We have specimens in both dresses killed in March and again six months later in August—September, and further properly sexed examples described or remarked upon by Schlegel *(g 1)*, Salvadori *(d 2)*, and Sharpe *(7)*, prove that the differences are of a sexual nature.

Measurements.	Wing	Tail	Bill from nostril	Tarsus
a. (Nr. 6148) ♂ ad. Manado, Mch. 1871 (M.)	146	113	37	—
b. (C 10860) [♂] ad. Manado; Aug., Sept. 1892 (N. C.)	149	119	38.5	20
c. (C 2282) ♂ vix ad. Manado, Mch. 1871 (M.) . . .	141	—	36	—
d. (Nr. 6153) [♀] ad. Manado	146	—	38.5	21
e. (C 2286) ♀ ad. Manado, Mch. 1871 (M.)	142	121	39	21
f. (C 2285) ♀ ad. Manado, Mch. 1871 (M.)	150	117	40	21
g. (Nr. 6152) ♀ ad. Manado, Mch. 1871 (M.)	144	113	39.5	—
h. (Nr. 6151) ♀ vix ad. Manado, Mch. 1871 (M.) . . .	144	116	37	—
i. (Nr. 6150) ♀ ad. Manado . . . , ...	147	—	39	—
j. (C 10859) [♀] vix ad. Manado, Aug., Sept. 1892 (N. C.)	143	114	37	—
k. (C 12256) juv. Lotta, Msa., 14. IV. 93 (N. C.) . . .	122	58	28	20
l. (C 12257) juv. Manado tua Id., 8. IV. 93 (N. C.) . .	120	59	26	19
m. (C 14192) [♂] ad. Lembeh Id., Feb. 1895 (N. C.) . .	146	110	40	21
n. (C 14193) [♂] ad. Lembeh Id., Mch. 1895 (N. C.) . .	141	110	35	—

Observation. In old examples the bill appears to be thinner as well as longer, being a little more narrowed at the sides near the base and the ridge of the culmen sharper.

Eggs. 3; white and transparent; 30 × 25 mm (Meyer *d 3*).

Nest. In a white ants' nest the size of a gourd. Half of the ants' nest destroyed by the bird, cavity for the eggs six inches in diameter, entrance two inches in diameter and nine inches long. The nest was still partly inhabited by the ants (Meyer *d 3*). Two other eggs of this species were found by Meyer lying on the ground and dirty.

Breeding season. The above nest was found in the Minahassa, March 17th. The young fly — as shown by the two specimens in the Dresden Museum — at the end of March or in April.

Distribution. Celebes, Northern Peninsula: Minahassa (Forsten *g 1*, Wallace *b 4*, *I*, Rosenb. *g 4*, Meyer *d 3*, *etc.*); Gorontalo Province (Rosenb. *g 4*); Manado tua Id. and Lembeh Id. (Nat. Coll. in Dresden Mus.).

† 2. **Monachalcyon monachus intermedius** Hart.

Nov. Zool. 1897, 163.

Diagnosis. Differs conspicuously from the typical form of N. Celebes in having the head of a much deeper blue, and with a distinct, though faint, greenish tinge; the tail a little less washed with blue; the breast and abdomen a shade lighter than in the most males of the typical form, the bill apparently a little thicker. Wing about 142 mm; tail about 127; beak 50 (Hartert).

Distribution. Western Celebes — Tawaya (Doherty).

Observation. A single specimen, a male, was obtained by Mr. Doherty at the above spot. Mr. Hartert had the great kindness to bring this specimen, together with the only

known female of *M. capucinus*, to Dresden at the meeting of the German Ornithologists' Union 1897, and he agrees with us that, while *M. capucinus* may be allowed to stand as a good species, easily distinguishable by its greenish black head, the form *intermedius* should rank only as a race of *M. monachus* typical.

As Wallace and Meyer remark *(b 4, d 3)* *M. monachus* lives, not near river-banks, but in the forest, and Wallace noted that it is insectivorous in its habits, feeding on *coleoptera*, *gryllae*, etc. *(1)*. The bird appears to moult about August, as shown by a specimen in the Dresden Museum (C 10860).

Touching its relationship with other genera Sharpe considers (Monogr. p. XLV) that *Monachalcyon* "shows no direct affinity to any existing genus, and the only place I can assign to it is in the vicinity of *Tanysiptera* . . . It is very probably derived from the same parent-stock, and, being isolated in the island of Celebes, has been modified into its present form". The author also remarks (p. XVIII) that in form of bill *Monachalcyon* seems intermediate between *Tanysiptera* and *Halcyon*, being in general plumage not far removed from the cinnamon group of *Halcyones*. We differ in so far from Dr. Sharpe as to think that *Monachalcyon* may be described as a small-billed and long-tailed *Halcyon*, and that its nearest existing allies are the long-tailed *Halcyones* of the Philippines, *H. hombroni* of Mindanao and *H. lindsayi* and *moseleyi* of Luzon and Negros. The first-named species has indeed been confounded with *M. monachus* by so experienced an ornithologist as Prof. Reichenow *(3)*. In his recent Catalogue of the Kingfishers (Cat. B. XVII, 1892, 296) Dr. Sharpe includes *Caridonax fulgidus* of Flores and Lombok in the genus *Monachalcyon*, and, like Hartert, we acquiesce in this view, though this species has a rounded culmen (in *M. monachus* the ridge is rather sharp), and the tail much more graduated, the outermost feather being only $^5/_8$ the length of the tail instead of about $^5/_6$ as in *M. monachus*, and it is said to haunt low woods and thickets, while *M. monachus* is a forest bird. It differs moreover so greatly in coloration that it may prove to be less nearly related to *Monachalcyon* than are the nearest members of *Halcyon*, *H. hombroni* and its allies.

† * 93. MONACHALCYON CAPUCINUS M. & Wg.

Black-cowled Kingfisher.

Plate IX.

Monachalcyon capucinus *(1)* M. & Wg., Abh. und Ber. Mus. Dresden 1896, Nr. 2, p. 12; *(2)* Hart., Nov. Zool. 1897, 160.

a. **Monachalcyon monachus capucinus** *(1)* Hart., Nov. Zool. 1897, 163.

"Bukaka daka daka", Tonkean, E. Celebes (Nat. Coll.).

Diagnosis. Differs from *M. monachus* of North Celebes by having the head and face black (instead of China-blue), the tail olive-green (not washed with blue), the remiges dusky olive-green (not washed with blue), the remaining upper parts clearer olive-green, the

whitish of the chin and throat not extending so far down towards the jugulum (type [♂] Tonkean, East Celebes, May—Aug. 1896: Nat. Coll. — C 14761).

Wing 150 mm; tail 115; bill from nostril 41; tarsus 21.

Female. Like the male, but the superciliary region, face and ear-coverts ferruginous, below the eye blackish and at the base of bill varied with blackish; back a shade yellower olive; "eye brownish grey, bill orange [red], feet orange-brown"; wing 146 mm; tail 120; tarsus 22; bill from nostril 42 (♀, Macassar, July 1896: W. Doherty in the Tring Museum).

Distribution. Eastern and Southern Peninsulas of Celebes: Tonkean (Nat. Coll.), Macassar (Doherty).

At the time of writing only two specimens of this species are known, the type, a male in the Dresden Museum, and a female from Macassar in the Tring Museum most kindly lent to us for comparison by Mr. Hartert. Possibly the head of the latter is not quite so deep black as in the male, the middles of the feathers having a stronger sea-green tint and being more powdery-looking. The feathers appear to be fresher than in the type, the more powdery look is probably transient and the head might get blacker with wear. The back is a shade yellower olive. These differences are so small that they will probably be more than bridged over by individual variation. There is a gloss of blue-green on the head of the male, hardly perceptible except on the cheeks and ear-coverts, and the concealed middles of the feathers are greyish — not clear black. It would be a matter of much interest if this well-marked form should prove in other parts of Celebes to pass into the typical *M. monachus* by imperceptible gradations. Mr. Hartert, as shown above, has described a form from Tawaya, West Celebes, which he considers intermediate (cf. *supra*). It differs from *M. capucinus* by having a deep blue, or deep greenish blue, cowl, and a wash of blue on the tail.

The Eastern Peninsula of Celebes is separated from the Northern Peninsula only by the 40 miles or so of width of the Gulf of Tomini, but by land the distance is much greater than from the Southern Peninsula. It can therefore call for no great surprise, if the fauna of the Eastern Peninsula proves to have more in common with the Southern than with the Northern Peninsula. Besides *M. capucinus*, other characteristic southern forms which have been found in the Eastern Peninsula are *Microstictus wallacei* and *Pyrrhocentor celebensis rufescens*. The specimens of *Phoenicophaes* are more like the northern individuals: some other birds are not yet known from other quarters of Celebes.

† 94. MONACHALCYON PRINCEPS Rchb.[1])

Juvenile Cowled Kingfisher.

a. [**Dacelo cyanocephala** Forsten in lit.]
b. [**Dacelo monachus** Temm. MS. Leyd. Mus.]

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[1]) For a long time this species was held by Schlegel, Sharpe, and other ornithologists to be the young of *M. monachus*. It was recognised as distinct by Temminck and Forsten, but the names chosen

c. [**Halcyon monachus** pt. *(1)* Gray, Gen. B. I, 1846, 79 (descr. null.).]

Monachalcyon princeps *(I)* Reichb., Handb. Alced. 1851, 38, t. 425, fig. 3157; *(2)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 653 part. (descr. of young); *(3)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 7.

d. **Dacelo princeps** pt. *(1)* Schl., Mus. P.-B. Alced. 1863, 24; *(II)* id., Vog. Ned. Ind. Alced. 1864, 20, 53, pl. 7, fig. 3; *(3)* id., Revue Alced. 1874, 16.

e. **Monachalcyon monachus** pt. *(I)* Sharpe, Monogr. Alced. 1870, 255, pl. 98, fig. 3; *(2)* Guillem., P. Z. S. 1885, 547.

f. **Halcyon cyanocephala** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 51.

g. **Monachalcyon cyanocephalus** *(1)* Meyer, Ibis 1879, 60; *(2)* Sharpe, Cat. B. XVII, 1892, 295; *(3)* Hart., Nov. Zool. 1897, 163.

h. **Monachalcyon cyanocephala** *(1)* W. Blas., J. f. O. 1883, 135.

Figures and descriptions. Reichb. *I*; Schl. *d II, d 1*; Sharpe *e I, g 2*; Brüggem. *f 1.*

Adult male. General colour above dark bistre-brown, the mantle, wing-coverts, scapulars and upper tail-coverts terminally bordered with cinnamon; entire head and nape, ear-coverts, and malar region, cyanine-blue; lores cinnamon, the forehead also slightly touched with cinnamon; neck cinnamon, the feathers crossed with a subterminal bar of dusky, the colour of their basal parts; under parts white, washed with cinnamon on breast, sides and under tail-coverts, and crossed from the upper chest downwards with somewhat broad brace-shaped bars of brown, broadest on the sides; under wing-coverts and inner webs of quills below towards their basal part cinnamon, the former marked with a few brown bars ([♂] Gorontalo, Nr. 8186). Bill very pale horn, darker about the middle of the upper mandible.

Immature [male]. Like the adult male, but the under surface and under wing-coverts more broadly and plentifully barred with brown; the cinnamon margins to the feathers of the upper surface of a more rufous cinnamon tint and preceded by a subterminal dusky line passing into the brown of the back (Gorontalo, Nr. 8185).

Adult female. Differs from the form described as the adult male in having a stripe of pale cinnamon stretching from the lores above the eye to the ear-coverts and a similar stripe from the rictus below the eye to the ear-coverts, with a blue stripe between them; the under surface more plentifully barred. "Iris brown; bill horn-yellow-brown; feet brown" (Rurukan, ♀, 5. XI. 84: Platen in Mus. Nehrkorn, Nr. 916).

An adult female in the Sarasin Collection, killed in the breeding-season, had the "bill yellow, above greyish, also below at the sides; iris dark brown; feet yellow-grey" (♀ Rurukan, 26. III. 94, P. & F. S.).

Young female. With cinnamon superciliary and malar stripes as in the adult female, the malar stripe more extended and broader, the ear-coverts black, the bars on the breast narrower and more irregular. Bill shorter, blackish in colour, tip whitish (♀, Tomohon, 7. VI. 94: P. & F. Sarasin). See, also, Brüggemann *f 1.*

Young male (just about able to fly). Like the adult male — without the superciliary and malar stripes of the female; a little cinnamon on the lores; bill much smaller and shorter than in the adult and with a slight hook at the tip, terminal third yellowish white, basal part blackish horn (♀, Tomohon, 27. III. 94: P. & F. S.).

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by these authors were never published. Its distinctness was again pointed out by Dr. Brüggemann in 1876 *(f 1)*, who gave the present species Forsten's MS. name *cyanocephala*, but in 1851 Reichenbach had already figured and described it as *M. princeps* from a specimen in the Dresden Museum. It appears that in calling this form *princeps* and the foregoing species *monachus* Reichenbach and Bonaparte misapplied Forsten's and Temminck's unpublished names, but this, though a little to be regretted, does not call for further comment.

Measurements.	Wing	Tail	Bill from nostril	Tarsus
a. (Nr. 3688) ad. [♂] Celebes (type of *M. princeps*) . .	114	88	—	18
b. (Nr. 8186) ad. [♂] Gorontalo	120	96	34	17
c. (Nr. 8185) vix ad. [♂] Gorontalo	115	90	33	18
d. (Nr. 3687) ad. [♂] Manado	114	85	34.5	—
e. (Sarasin Coll.) ♀ ad. Rurukan, 26. III. 94 . . .	117	85	31	18

Eggs. "The two eggs of this species sent to me by Dr. Platen from Rurukan in the Minahassa are, like those of all *Alcedidae*, white, yet without gloss; the shell very delicate. They measure 33 × 25.5 mm" (Nehrkorn MS.).

Distribution. Celebes, Northern Peninsula: Minahassa (Forsten *d 1*, *d II*, v. Rosenberg *d 3*, *f 1*, etc.); Gorontalo District (Riedel in Dresd. Mus.).

As in the case of *M. monachus* the two different dresses, which we have described as of a sexual character, have been treated by Brüggemann *(f 1)* as seasonal dresses. Specimens, the sex of which have been ascertained, are very scarce, but through the kindness of Mr. Nehrkorn we have been able to describe an adult female with two cinnamon stripes on the sides of the head. The specimen figured by Schlegel *(d II)* has also two stripes on the sides of the head and is marked ♀ juv. The Drs. P. & F. Sarasin, when in Celebes, paid much attention to this question, and sent home an adult female ready to breed, a quite young female, and a male just out of the nest. They and the two above prove that the male has a complete blue cowl, covering the head, face, ear-coverts and nape, while the female has a cinnamon superciliary and a similar malar stripe, and these sexual differences — as is known to be the case in some other Kingfishers — exist from the very first. The example described by Dr. Sharpe in the Catalogue of Birds should be an adult female.

The plumage of this species has a curiously immature appearance which led to its being treated of as the young of *Monachalcyon monachus*, until its distinctness was pointed out by Brüggemann in 1876 *(f 1)*. Chief among its differences are the relation of the primaries to one another; in the present species the third is nearly as long as the fourth and fifth and longer than the sixth, in *M. monachus* the sixth is equal to, or longer than, the third. *M. princeps*, too, is altogether a much smaller species.

The plumage of *Monachalcyon princeps* appears to be ancient in character. Dr. Sharpe, speaking of it as the young of the foregoing species, remarks (Monogr. 1870, p. XVIII, XLV) that it very much resembles the young of *Tanysiptera* (compare Monograph, plate 98, *M. monachus* — fig. on the left, with plate 101, *Tanysiptera doris* and plate 106, *T. hydrocharis*). The adult *Tanysiptera* has of course made a vast departure from this plumage. Again *M. princeps* has much in common with *Halcyon lindsayi* of Luzon and *H. hombroni* of Mindanao, though, while *M. monachus* most closely resembles *H. hombroni*, the present species bears most likeness to *H. lindsayi*.

GENUS CITTURA Kaup.

This genus is peculiar to the Celebes Province. Size medium; the bill very broad and flat, much broader than deep, in length from the nostril twice its width or less (in *C. sangirensis* sometimes a little more), in colour red when adult; the tail is long, about 3 times the length of the bill, strongly graduated, the outermost feathers little more than half the length of the tail; the tarsus is scarcely shorter than the middle toe without the claw; the 1st primary is about equal to the secondaries, the 3rd, 4th and 5th the longest. Two species. Sexes slightly different.

+ * 95. CITTURA CYANOTIS (Temm.).

Broad-billed Kingfisher.

a. **Dacelo cyanotis** *(I)* Temm., Pl. Col. pl. 262, 1824 (Sumatra!); *(2)* Less., Tr. d'Orn. 1831, 248 (Sumatra!); *(3)* Gray, Gen. B. 1846, I, 78; *(4)* id., List Fissirostr. Brit. Mus. 1848, 52; *(5)* Bp., Consp. 1850, I, 154; *(6)* id., Consp. Vol. Anisod. 1854, 9, Nr. 113; *(7)* Wall., Ibis 1860, 142; *(8)* Schl., Mus. P.-B. 1863, 22; *(IX)* id., Vog. Ned. Indië, Alced. 1864, 18, 51, pl. 6, fig. 1, 2; *(10)* Finsch, Neu Guinea 1866, 160; *(11)* Gray, HL. 1869, I, 89; *(12)* Schl., Rev. Alcedin. 1874, 14; *(13)* Rosenb., Malay. Archip. 1878, 271.

Cittura cyanotis *(1)* Kaup, Verh. nat. hist. Ver. Hessen 1848, 68 (Familie d. Eisvögel 8); *(II)* Reichb., Hb. spec. Orn. Alcedin. 1851, 38, t. 429, f. 3170; *(III)* Sharpe, Monogr. Alcedin. 1868, pp. XX, XXXVII, 301, pl. 119; *(4)* Wall., Malay Archip. 1869, I, 413; *(5)* Wald., Tr. Z. S. 1872, VIII, 44; *(6)* Salvad., Ann. Mus. Civ. 1875, VII, 654; *(7)* Brüggem., Abh. Ver. Bremen 1876, V, 54; *(8)* Lenz, J. f. O. 1877, 368; *(IX)* Rowley, Orn. Misc. 1878, III, 131—143, pl. XCIX; *(10)* Meyer, l. c. remarks; *(11)* id., Ibis 1879, 63; *(12)* W. Blas., J. f. O. 1883, 136; *(13)* Meyer, Isis, Dresden 1884, 19; *(14)* Guillem., P. Z. S. 1885, 548; *(15)* W. Blas., Ztschr. ges. Orn. 1886, III, 90; *(16)* Tristr., Cat. Coll. B. 1889, 95; *(17)* Heine & Rchw., Nomencl. Mus. Hein. 1890, 168; *(18)* Sharpe, Cat. B. XVII, 1892, 292; *(19)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 7; *(20)* iid., ib. 1896, Nr. 2, p. 13; *(21)* Hart., Nov. Zool. 1897, 163.

"Kikis talun", Minahassa, Alfurous name, Meyer *10, 11.*

"Radja udang utan", Malay near Manado, Nat. Coll.

"Bulu bebek", Minahassa, Guillem. *14.*

"Bukaka memejang", Tonkean, E. Celebes, Nat. Coll.

Figures and descriptions. Temminck *a I*; Schlegel *a IX*; Sharpe *III* (♂), *18*; Rowley *IX* (♀); Reichb., *II*; Salvad. *6*; Brüggemann *7*; Lenz *8*; Meyer *10*; W. Blasius *15.*

Adult male. General colour above raw umber washed with olive, becoming buff on the outer webs of the scapulars, hazel-chestnut on the rump and tail, and washed with orange-rufous on the head above and nape; a narrow line above and below the eye, continuous with a broad stripe on the sides of the occiput, dark marine-blue; the tips of the feathers of the supraorbital region, continued above the blue stripe, ochraceous buff, the bases dark blue, dusky black at the extreme base; wing-coverts dark marine-blue, where concealed by the scapulars black, quills dusky, the inner

ones washed with pale russet; entire under surface pinkish and vinaceous buff, becoming ochraceous buff on the cheeks and ear-coverts, where some of the feathers are particoloured, being marine-blue on the upper web and helping to form the blue stripe on the sides of the occiput; metacarpal edge pinkish buff; under wing-coverts of the same colour, but blackish near the metacarpal edge (Manado, C 2293). Iris rosy red; bill and feet dark red; claws blackish brown (Meyer *11*).

Adult female. Like the male, but with the wing-coverts, superciliary stripe and parietal patch black or blue-black instead of blue, the superciliary line of feathers, continued above the parietal patch, tipped with silver-white or pearl-blue (Manado, Nr. 6199, C 2299; ♀ ad. Pinogo, Bone Valley, 9. Jan. 1894: P. & F. Sarasin).

Young male. Resembles the adult male in coloration. Bill black (Meyer *10*, *11*).

Young female. Resembles the adult female; wing-coverts more wood-brown, the inner ones black; bill black, shorter than in adult (Manado, Nr. 6198). "Iris rose-colour; feet red-brown; bill red-brown, in part black" (Kema, 16. Aug. 93: P. & F. S.).

Measurements.	Wing	Tail	Bill from nostril	Tarsus
a. (C 2293) [♂] ad. Manado	101	95	28	14.5
b. (C 2292) [♂] ad. Manado	100	98	—	14.5
c. (Nr. 6196) [♂] ad. Manado	98	93	28	—
d. (Nr. 6197) [♂] imm. Manado	100	94	24	14.5
e. (C 2304) [♀] ad. Manado	100	95	28	15.5
f. (C 2299) [♀] ad. Manado	100	92	27	14.5
g. (C 2301) [♀] ad. Manado	103	96	28	—
h. (C 2298) [♀] ad. Manado	100	—	28.5	—
i. (Nr. 6199) [♀] ad. Manado	103	88	27.5	—
j. (Nr. 6198) [♀] juv. Manado	96	—	21 ca.	—
k. (C 14198) [♀] ad. Lembeh Id. 28. II. 95 (Nat. Coll.)	99	97	31	15
l. (C 14199) [♀] ad. Lembeh Id. 2. III. 95 (Nat. Coll.)	104	98	28	—
m. (C 14200) [♂] ad. Lembeh Id. 26. II. 95 (Nat. Coll.)	99	94	29	—
n. (Sarasin Coll.) ♀ ad. Pinogo, 9. I. 94	99	88	28	—
o. (Sarasin Coll.) ♀ vix ad. Ussu, S. E. Celebes 20. II. 96	96	85	28	14
p. q. r. (14444—46) [♀ ♀, ♂ juv.] Tonkean, E. Cel. (N. C.)	100-105	92-101	—	—

Observation. Of 19 other specimens recently sent to the Dresden Museum from the Manado District by our native hunters, 6 had the superciliary stripe of light pearl-blue-tipped feathers, and black lesser and middle wing-coverts, the remaining 13 had the superciliary tips ochraceous and the ear-coverts and wing-coverts deep blue, the difference — a sexual one — being well-marked, as in those now before us.

Eggs and breeding habits unknown.

Distribution. Celebes — Northern Peninsula: Minahassa (Forsten *a 8*, Wallace *a 7*, v. Rosenberg *a 12*, Meyer *10*, *11*, etc.), Gorontalo Distr. (Rosenb. *a 12*, P. & F. S. *19*); E. Celebes (N. C.); Ussu, S. E. Celebes (P. & F. Sarasin); Tawaya, W. Celebes (Doherty *21*).

This Kingfisher was for a long time known only from the northern arm of Celebes, though further explorations in the island have now shown that it has a wider range.

It has recently been found in West Celebes by Doherty, at Tonkean, East Celebes, by our native hunters, and in S. E. Central Celebes by the Drs. Sarasin. Our two females from East Celebes and the Sarasins' female from the South-

east have the silvery tips of the long superciliary stripe longer than in females from the north, and seem to present a slight racial departure.

As to the habits of this species: "It lives", says Meyer *(10, 11)*, "like *Monachalcyon princeps*, only in the forest, not on river-sides; and it is not at all a rare bird, according to my experience. It likes to sit dreaming alone on branches of trees. Its cry is, five or six times one after another, kebekek. In the stomach I found insects, crabs, worms, etc".

"Male and female are easily to be distinguished, viz. from the colour of the wing-coverts and the sides of the head, which is blue in the male, black or bluish black in the female; the male has no white superciliary spots. Even the young ones, which were alive in my possession, show this difference". Among the Kingfishers the same condition obtains in *Monachalcyon*, possibly in some species of *Halcyon* in Western Polynesia (Wg., Aves Polyn. 16), and to some extent in some species of *Ceryle*.

The only other species of the genus *Cittura* is *C. sangirensis* Sharpe of the Sangi Islands, an important link between Celebes and those islands, distinguishable by its larger size, black frontal band and malar region at the gape and by its mauve ear-coverts, sides of neck, and chest. Both sexes of this species, too, resemble the female of *C. cyanotis* in having a pearl-blue or silvery line of feather-tips over the eye, but the male has blue wing-coverts, the female black ones, as in the sexes of *C. cyanotis*. Perhaps, as Meyer has remarked *(10)*, allied species are still to be discovered somewhere in Borneo or the neighbourhood.

Of the two, *C. sangirensis* may perhaps be the one more likely to have varied in a lesser degree from the ancestral type. The female of *C. cyanotis*, which may probably be regarded as of a more ancient type than the male, partakes of the coloration of *C. sangirensis* not only in the points mentioned, but in having usually a wash of phlox-purple about the ear-coverts and throat, and it has been confused with *C. sangirensis* by Lenz *(8)* and Guillemard *(14)*. Mr. Keeler, too, believes that the colour of the basal part of feathers of birds in general have a phylogenetic value; if this be so, *C. cyanotis* should be sprung from a bird with a black or dark crown and malar region, but a pale chin (as it still has). *C. sangirensis* has the forehead, a broad eyebrow, occipital side-patch, malar and subocular region black; in this respect, therefore, it is possible that it should be regarded as the more ancestral form.

♂ 96. CITTURA SANGIRENSIS Sharpe.

Sangi Broad-billed Kingfisher.

Cittura sanghirensis *(I)* Sharpe, P. Z. S. 1868, 270, pl. 27 ♂; *(II)* id., Monogr. Alcedin. 1868, 299, pl. 118 ♂; *(3)* Newton, Ibis 1869, 215; *(4)* Salvad., Ann. Mus. Civ. Gen. 1876, IX, 53; *(V)* Rowley, Orn. Misc. 1878, III, 132, pl. (♀); *(6)* Meyer,

ib. 136—140, remarks; *(7)* id., Ibis 1879, 63; *(VIII)* id., Vogelskel. 1882, 21, pl. XXVI; *(9)* id., Isis, Dresden 1884, Abh. I, 6, 19; *(10)* W. Blas., Ztschr. ges. Orn. 1886, 91; *(11)* id., Ornis 1888, 576—578; *(12)* Tristr., Cat. Coll. B. 1889, 95; *(13)* Sharpe, Cat. B. XVII, 1892, 293.

a. **Dacelo sanghirensis** *(1)* Finsch, pt. in Sharpe *II*; *(2)* Gray, HL. 1869, I, 89; *(3)* Schl., Mus. P.-B. Rev. Alced. 1874, 14.

b. **Cittura cyanotis** pt. *(1)* Lenz, J. f. O. 1877, 368.

"Bengka kehu", Great Sangi, Nat. Coll.

Figures and descriptions. Sharpe *I, II, 13*; Rowley *V*; Meyer *VIII* (skeleton), 6; W. Blasius *11.*

Adult male. Head above russet, washed with orange-rufous, passing into raw umber on hind neck and middle of back; outer webs of scapulars light cinnamon, passing into the colour of the back; upper tail-coverts and tail dark cinnamon-rufous; a frontal band, a patch at base of lower bill, continuous with the sub- and supra-orbital region black, becoming very dark marine-blue on the sides of the occiput; above this a long superciliary line of pearly white-tipped feathers; wings dusky black; wing-coverts very dark marine-blue; chin and upper throat white; ear-coverts, sides of neck, and a broad wash across the upper chest light phlox-purple; remainder of under surface buff, washed with cinnamon-rufous on lower flanks and tail-coverts; edge of wing and under wing-coverts white, but black next to the edge of wing (Gr. Sangi — Nr. 6193). Bill sealing-wax red; iris light red; feet red-brown (Platen *11*).

Adult female. Like the male, but the parietal stripe and wing-coverts black, with little or no blue colouring in it (Blas. *11*; Gr. Sangi — C 12703, 12704).

Young male. Like the adult male; bill shorter, red-brown: — Platen (Gr. Sangi, Nr. 6192), with very small pale tips to the wing-coverts (Blas. *11*).

Young female. Like the adult female; bill shorter, a little hooked at the tip, red-brown: — Platen (Blas. *11*; Gr. Sangi, Nr. 6195).

Iris and feet of young as in adult (Platen *11*).

Observation. A specimen from Siao before us does not differ from those of Great Sangi.

Measurements.	Wing	Tail	Bill from nostril	Tarsus
a. (Nr. 6194) [♂] ad. Gr. Sangi	113	101	35	16.5
b. (Nr. 6193) [♂] ad. Gr. Sangi	108	98	34	16
c. (Nr. 6191) (♂] vix ad. Siao	110	98	34.5	16
d. (Nr. 6192) [♂] juv. Gr. Sangi	108	100	29.5	16.5
e. (C 12703) [♀] ad. Gr. Sangi, 21. VII. 93	114	100	35	17
f. (C 12704) [♀] ad. Gr. Sangi, 13. VII. 93[1])	107	94	35	—
g. (Nr. 6195) [♀] juv. Gr. Sangi	103	55	25	15.5

Thirteen adults measured by Prof. Blasius *(11)* vary as follows: wing 106—117; tail 97—109; culmen 39.5—45; tarsus 16—18 mm; length in the flesh (Platen) 260—270.

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[1]) This specimen is moulting. A number of other species appear to moult in July in the Sangi Islands.

Skeleton.

Length of cranium	78.0 mm	Length of tibia	38.0 mm
Breadth of cranium	25.6 & 27.5 »	Length of tarso-metatarsus	16.2 »
Length of humerus	33.6 »	Length of sternum	25.5 »
Length of ulna	44.0 »	Greatest breadth of sternum	21.0 »
Length of radius	40.5 »	Height of crista sterni	7.8 »
Length of manus	29.4 »	Length of pelvis	29.0 »
Length of femur	22.6 »	Greatest breadth of pelvis	23.0 »

Egg and breeding habits unknown.

Distribution. Sangi Islands — Great Sangi (Hoedt *a 3*, v. Duivenb. *a 3*, Meyer *6*, *9*, Bruijn *4*, Platen *11*, Nat. Coll. Mus. Dresd.); Siao (Meyer *6*, *9*).

This species appears to be fairly abundant in Great Sangi, but scarce in Siao, where it has only been obtained as yet by Meyer's hunters. It is a handsomer species than its near and only known ally, *Cittura cyanotis* of Celebes, from which it may be easily distinguished by its black frontal band, black malar region, light phlox-purple ear-coverts and chest, and larger size. Its coloration, as pointed out in our article on that species, appears to be of a more ancestral type.

Cittura ranks low as a form of Kingfisher, and the bill of the young is of interest, partaking as it does more of the *Melidora*-type than does that of the adult *Cittura*, and it lends further confirmation therefore to Dr. Sharpe's views. The bill of the young *Cittura* is dark in colour, a little hooked at the tip, and very flat towards the base, the nostrils being situated at the inner edge of a rather flat ledge, with the ridge of the culmen standing up high between them; the bill of the adult is red, without a hook, and fairly round at the sides, the ridge of the culmen less raised. In his notable "Monograph" Sharpe writes, p. XLIV: "Turning . . . to *Melidora* we seek the links which may still be left us on the globe whereby to connect forms apparently so different, and at once seize upon *Cittura* as the nearest approach to this extreme form; for here is also seen the grooved bill, although the maxillary hook is absent". The probable significance of the little maxillary hook in the young *Cittura*, and of the dark colour of its bill, that of *Melidora* being black — thus become apparent; but the shape of the bill about the nostrils does not seem to point to a form like *Melidora*, but more likely to a lost ancestral form of both. *Melidora* is confined to New Guinea, *Dacelo* to Australia and New Guinea, and the insectivorous Kingfishers in general "have their greatest development in the Austro-Malayan subregion, while the piscivorous Kingfishers are found all over the globe, except Oceania" (Sharpe, p. XLVII). In considering the geographical distribution of the Kingfishers it may be of importance to observe that the countries which have preserved for us what appear to be the most ancient Kingfishers are tenanted by ancient faunal and floral types in general. Up to the present palaeontology has brought no evidence of the existence of the lower forms of true Kingfishers in other parts of the globe; as Prof. Newton remarks (Dict. B. 1893, 489),

"the only fossil referred to the neighbourhood of the Family is the *Halcyornis toliapicus* of Sir R. Owen (Br. Foss. Mamm. and Birds, p. 554) from the Eocene of Sheppey — the very specimen said to have been previously placed by König (Icon. foss. sectiles, fig. 153) in the genus *Larus*". Mr. Lydekker (D. B. 281) also considers this fossil to be Larine in character. Prof. Zittel, besides, mentions (Hdb. d. Palaeont. 1890, III, 852) uncertain remnants of *Alcedo* in the Eocene of Paris and of *Ceryle* in the bone-caves of Brazil. Under these circumstances there is no telling what palaeontology will have to say on the subject in the future, and it may be hazardous to form an opinion from our present very scanty knowledge.

FAMILY CORACIIDAE.

In external appearance the Rollers are very like a Daw or Jay. The best means of distinguishing them at sight from such corvine Passeres is furnished by the nostril, which in the *Coraciidae* is elongated and covered above by an operculum of skin, on to which the plumage of the forehead extends, while in corvine birds the nostril is a roundish hole screened by long bristles. Anatomically, of course, there are important differences: the Rollers have both carotid arteries, the skull is desmognathous, the deep flexor tendons of the foot become fused before branching off to the four toes (see Beddard in Dresser's Mon. Corac.). The Broad-billed Rollers *(Eurystomus)* are again very like the Broad-bills *(Eurylaemi)*, but the form of the nostril is sufficient for their distinction.

According to Gadow, the Rollers are distinguishable from the other members of the order *Coraciae (Momotidae, Alcedinidae, Meropidae,* and *Upupidae)* by having 14 cervical vertebrae, the spina interna being wanting; from the Kingfishers and Bee-eaters the Rollers differ in the form of the bill and foot, the bill being decurved, stout, and with a pendant tip or hook, the foot having the anterior toes free, or free from the basal joint, instead of having the third and fourth toes united down to the penultimate joint. In *Merops* the carotid-arrangement is different — the left one only being present.

The *Coraciidae* breed in holes in trees and lay white eggs.

GENUS CORACIAS L.

Bill nearly as long as the head, black or blackish, decurved, the tip overlapping the under mandible, compressed, much deeper than broad, nostril elongated, with a membrane above covered with the plumage of the forehead; some stout bristles above the gape; tarsus about as long as the hind toe and claw; wings moderate, 2nd, 3rd, and 4th quills longest; tail moderately long, square (in

some species with the outermost rectrices lengthened so as to form a deep fork). In size these birds are about equal to a Jay. The chief colours are blue and green. Dresser recognises twelve species inhabiting Africa, Europe and Southern Asia, the genus being absent in America and the Australian Region and, curiously enough, absent in the Great Sunda Islands, excepting Celebes.

† * 97. CORACIAS TEMMINCKI (Vieill.).

Celebesian Roller.

a. **Le Rollier Temminck** *(I)* Levaill., Ois. Parad. Rolliers 1806, III, Suppl. p. 46, fig. D.

b. **Galgulus temmincki** *(1)* Vieill., N. Dict. 1819, XXIX, 435; *(2)* id., Enc. Méth. 1823, 869.

Coracias temmincki *(1)* Wagler, Syst. Av. 1827, 215; *(2)* Gray, Gen. B. I, 1846, 62; *(3)* id., List Coraciae Br. Mus. 1848, 33; *(4)* Bp., Consp. 1850, I, 167; *(V)* Rchb., Hb. Merop. 1851, 51, t. 434, fig. 3187; *(6)* Gray, P. Z. S. 1858, 189 (N. Guin.); *(7)* id., Cat. B. New Guin. 1859, 189; *(8)* Cab. & Hein., Mus. Hein. 1860, II, 118; *(9)* Gray, P. Z. S. 1861, 433; *(10)* Wall., Ibis 1864, 41; *(11)* Blyth, ib. 1866, 345, 346; *(12)* Finsch, Neu Guinea 1866, 160; *(13)* Schl., Mus. P.-B. Coraces 1867, 138; *(XIV)* Gld., B. Asia pl. 56 (1869); *(15)* Gray, HL. 1869, I, 75; *(16)* Wall., Malay Archip. 1869, I, 337, 429; *(17)* Sharpe, Ibis 1871, 184; *(18)* Wald., Tr. Z. S. 1872, VIII, 43; *(19)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 655; *(20)* Brügg., Abh. Ver. Bremen 1876, V, 49; *(21)* Rosenb., Malay. Archip. 1878, 271; *(22)* Meyer, Ibis 1879, 59; *(23)* Salvad., Orn. Pap. 1880, I, 512; *(24)* Wall., Island Life 1880, 433; *(25)* W. Blas., J. f. O. 1883, 135; *(26)* id., Ztschr. ges. Orn. 1885, 242; 1886, III, 88; *(27)* Guillem., P. Z. S. 1885, 546; *(28)* Platen, Gefied. Welt 1887, 205; *(29)* Tristr., Cat. Coll. B. 1889, 98; *(30)* Heine & Rchw., Nomencl. Mus. Hein. 1890, 157; *(31)* Sharpe, Cat. B. XVII, 1892, 26; *(32)* Büttik., Zool. Erg. Weber's Reise in Ost-Ind. 1893, 274; *(XXXIII)* Dresser, Mon. Corac. 1893, 49, pl. XIII; *(34)* Newton, Dict. B. p. 794 (1894); *(35)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 7; *(36)* iid., ib. 1896, Nr. 1, p. 5; *(37)* iid., ib. 1896, Nr. 2, p. 13; *(38)* Hart., Nov. Zool. 1896, 158; *(XXXIX)* Meyer, Abb. v. Vogelskel. II, 1897, pl. CCXIV.

c. **Rollier d'Urville** *(I)* Quoy & Gaim., Voy. Astrol., 1830, Atl. pl. 16.

d. **Coracias papuensis** *(1)* Quoy & Gaim., op. cit. text, 1830, 220; *(2)* Sclat., Pr. Linn. Soc. 1858, 155.

e. **Coracias pileatus** *(1)* Bp., Consp. Vol. Anisod. 1854, 7, Nr. 210 (ex Reinw. MS.); *(2)* Reinw., Reis Ind. Archip. in 1821, 1858, 592.

f. **Eurystomus pileatus** *(1)* Gray, P. Z. S. 1860, 346 (Moluccas).

"**Tokkakak**", ("**Tonkaka**"—Guillem. *27*), Manado District, Mantehage, Lembeh and Banka Is., Nat. Coll. in Dr. Mus.

"**Kapala biru**" (Blue head), Malay, Minahassa, Meyer *22*.

"**Pateh rokos**", Minahassa, Meyer *22*.

"**Lungun-geü**", ?Gorontalo Distr., Rosenb. *21*.

"**Patjujung Dapo**", Tjamba Distr., S. Celebes, Platen *26*.

"**Djohak**", Tonkean, E. Celebes, Nat. Coll. in Dr. Mus.

Figures and descriptions. Dresser *XXXIII*; Gould *XIV*; Meyer *XXXIX* (skel.); Levaillant *a I*; Reichb. *V*; Quoy & Gaimard *c I*; Brüggem. *20*; W. Blas. *26*; Sharpe *31*.

Adult. Mantle, back, scapulars, and innermost quills sage-green, in certain lights olive-green, and touched on the borders of the feathers with verditer-blue; entire head above, including supra-orbital region, and upper tail-coverts Nile-blue, with a strong turquoise-blue gloss; wings, tail, and rump hyacinth-blue glossed with purple, the ends of quills and tail-feathers more dusky, the concealed inner webs — when seen held vertically with the light falling on them — bright dark bronze; ear-coverts and subocular region brownish bronze; under parts, continuous with a broad collar around hind neck, dusky blue, washed on the under parts with mauve-purple, and becoming violet-blue on the under tail-coverts, the hackle-feathers on chin touched with pale-blue, on throat with light violet; under wing-coverts, and most inner webs of quills below, and tail below, hyacinth-blue glossed with purple, the outer webs, the adjacent part of the inner webs, and the ends of the quills blackish, or dusky bronze, when the bird is held in an inclined position, bill lowest, with the light falling on it. (Near Manado, Aug.-Sept. 1892, C 10857). Iris brown; bill black; tarsus dirty brownish black (Guillem. *27*).

Observation. The coloration of the wings of this species is of much interest. The wings appear to be to some extent metallic; at all events the purplish blue is seen more widely spread on their under surface in certain lights. On the upper surface they are purplish blue, except on a narrow portion of the inner webs, probably always covered by the superjacent feathers where they are bronze or blackish, according to the light; on the under surface the converse is seen — where they are blue above they tend to bronze below, where they are bronze above they are blue below. The lines of demarkation of the tints, however, do not correspond above and below, nor are the colours on many quills — especially on the inner ones — sharply separated, but tend to blend with one another.

Sexes. Alike, but the female less brilliantly coloured (Meyer *22* — Limbotto, July, C 2191).

Young. Similar to the adults; bill much shorter, but otherwise like; the collar of dusky blue round the hind neck much narrower; the pale blue of the crown greyer and slightly washed with brown, the tips of the feathers brownish giving an indistinct barred appearance, the pale blue hackle-feathers of the chin extending further down on to the throat (N. Celebes, C 3597; near Manado, Aug.—Sept. 1892, C 10858). Iris light hazel; bill black; feet yellow-brown (Platen *26* — ♂ juv.). See, also, W. Blasius *26*, description ♂ juv.

Measurements (8 specimens). Wing 175 juv.—190; tail 127—144; bill from nostril 23.5 juv. —31; tarsus 22 juv., 23 ad.

Eggs and **Nest.** Unknown.

Breeding season. One of the young specimens in the Dresden Museum, killed Aug. or Sept., appears to be about six weeks old; hence the eggs would have been laid in June or July. Prof. W. Blasius's *(26)* young specimens from South Celebes, killed May 13th, must have been the product of an egg laid at least as early as March.

Distribution. Celebes: — Minahassa (Reinwardt *e 2*, Forsten *13*, v. Rosenberg *13*, etc.); Banka, Lembeh and Mantehage Is. off the Minahassa (Nat. Coll., Mus. Dresd.); Gorontalo District (Rosenb. *13*, Meyer *22*); Tonkean, E. Celebes (Nat. Coll. in Dresd. Mus.); Kandari, S. E. Peninsula (Beccari *19*); near Macassar (Wallace *16*, *31*, Everett *38*); Tjamba, S. Celebes (Platen *26*); Kadjang, S. Celebes (Weber *32*); Bulekomba, S. Celebes (Everett *38*).

The habitat of the species was recorded by Quoy & Gaimard *(d 1)* as New Guinea, which for a long time remained an uncertain locality for it, but

Salvadori *(23)* considers it indubitable, as we do too, that no species of the genus *Coracias* occurs in New Guinea and that the indication of Quoy & Gaimard is, therefore, wrong. The species seems to be strictly confined to Celebes.

In North Celebes this is a common bird. It follows the hoe of the field-labourer, says Platen *(28)*, examining the freshly broken ground for booty, always pursued and attacked by the greedy Crow, *C. enca*. Meyer *(22)* remarks that it "usually flies singly; but after feeding, several play together. They frequently sit on dead twigs and look out for grasshoppers and other insects; then suddenly rushing upon their prey they return to their perch. Cry tschirrr". In South Celebes Wallace found it a rare bird; Platen and Weber, too, obtained each but a single specimen. Wallace *(16)* observes that "it has a most discordant voice, and generally goes in pairs, flying from tree to tree, and exhibiting while at rest that all-in-a-heap appearance and jerking motion of the head and tail which are so characteristic of the great Fissirostral group to which it belongs. From this habit alone the kingfishers, bee-eaters, rollers, trogons, and South American puff-birds, might be grouped together by a person who had observed them in a state of nature, but who had never had an opportunity of examining their form and structure in detail".

Later in the same work *(16)* Mr. Wallace remarks that "the Celebes Roller is an interesting example of one species of a genus being cut off from the rest. There are species of *Coracias* in Europe, Asia, and Africa, but none in the Malay Peninsula, Sumatra, Java, or Borneo. The present species seems therefore quite out of place; and what is still more curious is the fact, that it is not at all like any of the Asiatic species, but seems more to resemble those of Africa". These views appear also to be those of no less an ornithologist than Dr. Sharpe who places *(31) C. temmincki* between *C. olivaceiceps* Sharpe of South Africa and *C. cyanogaster* Cuv. of Senegambia. Mr. Dresser *(XXXIII)* does not enter into the question of its affinities, but places it last in the genus next to *C. cyanogaster*. In our opinion *C. temmincki* has nothing to do with the latter species, which was placed with other African forms in a different genus by Bonaparte on account of its Swallow-tail, and it is very questionable whether *C. olivaceiceps* can be regarded as a nearer ally than *C. affinis* McClell. of India. In a later work *(24)* Mr. Wallace cites *C. temmincki* as a Himalayan form in Celebes, a designation which has at least an equal right to acceptance with his earlier view of the African affinities of the species.

In that the range of the genus is bounded to the east by the Moluccan Straits, *Coracias* conforms to the general rule found among Asiatic forms in Celebes. Its absence in Borneo, Java, Sumatra and Malacca is an enigma. It may be suggested that the genus was once represented in these countries, and has become extinct there; or it may be thought possible that an ancestral form, a migrant like *C. garrulus*, accidentally straggled to Celebes, and settled in Africa, varying in the same direction in both places; or half a dozen other

hypothetical explanations may be suggested, which would, however, not bring the problem to a solution in the present deficient state of our knowledge.

GENUS EURYSTOMUS Vieill.

Differs from *Coracias* by its shorter, broader bill, broader than deep across the nostril, not black in colour, but yellow or chiefly red (in the young duskier), the nostril a long, linear slit; no rictal bristles; the toes united for their basal joint; wing rather long and pointed, the 2nd quill a little longer than the 1st and 3rd. About seven or eight species, ranging from India to Australia and New Zealand; also Africa, and Madagascar.

98. EURYSTOMUS ORIENTALIS (L.).

Indo-Australian Broad-billed Roller.

As a species this bird ranges from the Himalayas and Amoorland in the north to Australia and, occasionally, to New Zealand in the south. It varies, of course, individually, like everything else that lives, and also to some extent racially, but both questions are very improperly understood. The two chief authorities of the present day on the Rollers, Dr. Sharpe and Mr. Dresser, are not in unison on the racial question: Dr. Sharpe (P. Z. S. 1890, 551; Cat. B. XVII 1892, 36, 38) would have it that there are three species and one subspecies; Mr. Dresser (Ibis 1891, 91—102, Mon. Corac. 1893, 70, 76) maintains the more generally accepted view of two species — a northern and a southern one. We prefer to avoid this troublesome question with the remark that Dr. Sharpe is probably wrong[1]) and Mr. Dresser probably not entirely

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[1]) We have paid considerable attention to Dr. Sharpe's views. Treating his three species and one subspecies as four races of *E. orientalis*, the following should be their geographical ranges:

1. **The typical E. orientalis** (Linn.), the stationary resident form of the East Indies from Cachar and the Burmese countries to the Great Sunda Islands (Sharpe) as far as Talaut (Nat. Coll. *16*), Sangi, Celebes (Mus. Dresd.), Peling (Nat. Coll.) and Halmahera (Salvadori).
2. **E. orientalis calonyx** (R. B. Sharpe), a more northern, migratory form, ranging from the Himalayas, where some examples at least appear to be stationary in places, though in Terai below Kumaon it is said by Mr. Thompson to arrive in April, breed in May, and leave in July and August (P. Z. S. 1890, 552), to "Amoor-land, Manchuria, and Northern China in summer, apparently wintering in Tenasserim and the Malayan Peninsula and Borneo" (Sharpe), Labuan, Java, Keeling Island, Ceylon, Sangi (Dresser, Ibis 1891, 101), Celebes (Dresser, and in the Dresden Museum).
3. **E. orientalis laetior** (R. B. Sharpe), "Southern India and Ceylon" (Sharpe), apparently a resident in Ceylon but very rare (Legge, B. Ceylon, 286), believed by Bourdillon (Str. F. 1876, IV, 382) to be a visitor only to Travancore, S. India.
4. **E. orientalis australis** (Swains.), apparently a more or less regular migrant, ranging from Celebes (Sharpe), Sula (Sharpe) and Buru (Salvad. Orn. Pap. I, 1880, 504) to Papuasia, Australia — where, in the Victoria basin, "it arrives early in spring, and, having brought forth its progeny, retires northwards on the approach of winter" (Gould, Handbook B. Austr. I, 120); in N. S. W. earliest arrival observed by Caley (Tr. Z. S. XV, 202) on October 3rd, 1809, disappearing early in February. Most plentiful about Christmas. — "Occasionally reaching to New Zealand" (Sharpe), four examples being known to Buller, stragglers killed recently on the West coast at the time the species visits Australia (B. New Zealand, 2nd. ed. 1888, I, 118).

right, and we think that other writers in a similar position to ours would also do well, in order not to involve themselves and others in more perplexity, to disregard the variations of this species and to speak of it simply as *E. orientalis*, until some one has thoroughly taken the whole matter in hand and shown what these variations really mean. The following references bear upon the occurrence of *E. orientalis* in the Celebesian Province.

Eurystomus orientalis (L.).

a. **Eurystomus pacificus** *(1)* Wall., P. Z. S. 1862, 339; *(2)* Legge, B. Ceylon, 1880, 285; *(III)* Dress., Mon. Corac. 1893, 75, pl. XIX.

Eurystomus orientalis *(1)* Schl., Mus. P.-B. Coraces, 1867, 139, 140; *(2)* Wald., Tr. Z. S. 1872, VIII, 43; *(3)* Brügg., Abh. Ver. Bremen 1876, V, 49; *(4)* Salvad., Ann. Mus. Civ. Gen. 1876, IX, 53; *(5)* Rosenb., Malay. Archip. 1878, 271; *(6)* Meyer, Ibis 1879, 60; *(7)* Salvad., Orn. Pap. 1880, I, 508; *(8)* W. Blas., J. f. O. 1883, 135; *(9)* Meyer, Isis, Dresden 1884, 6; *(10)* Guillem., P. Z. S. 1885, 546; *(11)* W. Blas., Ztschr. ges. Orn. 1886, 89; *(12)* id., Ornis 1888, 579; *(13)* Hickson, Nat. in N. Celebes 1889, 90; *(14)* Dresser, Ibis 1891, 101; *(15)* Büttik., Zool. Erg. Weber's Reise in Ost.-Ind. 1893, 274; *(16)* M. & Wg., J. f. O. 1894, 242; *(XVII)*

Two other forms, *E. crassirostris* Sel. of New Guinea and the New Britain Group, and *E. solomonensis* Sharpe of the Solomon Islands, are very nearly related to, but apparently do not intergrade with, the races of *E. orientalis*. *E. orientalis australis* and *E. crassirostris* occur in New Guinea together.

We give a key to Sharpe's supposed subspecies of *E. orientalis*, based upon the keys of Sharpe and Salvadori, and specimens before us:

a. Paler = *E. orientalis australis.*

b. Brighter, head more dusky.

b′ Terminal half of tail black.

b″ Head darker; blue colour of underparts more intense = *E. orientalis laetior.*

c″ Colours less intense = *the typical E. orientalis.*

c′ Terminal half of tail distinctly shaded with purplish blue = *E. orientalis calonyx.*

It should be observed that hard and fast lines cannot be drawn between subspecies — by definition they intergrade — and the above key is specially applicable only to the individuals from certain geographical areas in which the subspecies may be said to come to a head. Thus specimens from North China, where they are found in summer, appear from Sharpe's remarks (Ibis 1893, 562) to be always determinable as *E. orientalis calonyx;* at this time of the year the race which stays nearer the equator in the Sunda Islands and breeds there, is supposed by him to be *the typical E. orientalis* — at least nine specimens sent by Mr. Everett to Dr. Sharpe — date not stated — all proved to be of this race, but we have elsewhere recorded *calonyx*, as well as *orientalis* and intermediate specimens, from Peling in summer (Abh. Mus. Dr. 1896, Nr. 2, p. 13). Those which migrate to Australia in summer are of the race, *E. orientalis australis.* In Celebes, and doubtless in many other quarters, such as Burmah, S. India, the Philippines, Halmahera, a confusion of forms is found — at all events we cannot detect any well-defined races there. It will have been noted that three (!) of Sharpe's four subspecies of *E. orientalis* have been recorded from Celebes; moreover many of the 40 specimens in the Dresden Museum from there, Peling, Talaut and Sangi belong neither to *the typical orientalis* nor to *orientalis calonyx,* but are intermediate between the two, and such was the case with two of Mr. Dresser's five specimens from Celebes. We understand Sharpe to be of opinion that these specimens of Dresser's are intermediate between *E. orientalis* and *australis* (Cat. B. XVII, 34, footnote).

Among other things it should be borne in mind that the adults found in North China in summer are in full breeding plumage; probably they are duller in colour in winter and more like *the typical orientalis.* That this is so is shown by a specimen in the Dresden Museum from Great Sangi (C 838); it is moulting, and the new secondaries are washed with dark purplish on the external edges to their ends, while two or three old feathers are dull dusky, and the blue is not seen for the terminal inch of their outer webs, but only on the more basal part. The purple-blue is also just perceptible on the outer edges of the tail to its very tip, though indeed it would never be so conspicuous as in Sharpe's figure of *calonyx.*

Dresser, Mon. Corac. 1893, 67, pls. XVII, XVIII; *(18)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 8; *(19)* iid., ib. 1895, Nr. 9, p. 4; *(20)* iid., ib. 1896, Nr. 2, p. 13; *(21)* Hart., Nov. Zool. 1896, 176; *(22)* id., ib. 1897, 159.

b. **Eurystomus australis** *(1)* Sharpe, Cat. B. XVII, 1892, 36.

"Hendingo-Opo", Gorontalo?, Rosenb. *5.*

"Tjetje", Malay name, N. Celebes, Meyer *6.*

"Kokotaka", Talissi Id., Hickson[1]) *13.*

"Poopoopung", Siao, Nat. Coll. Mus. Dr.

"Atera", Talaut, iid.

For full synonymy and references see Salvad., Orn. Pap. 1880, I, 503 *(E. pacificus)* and 508 *(E. orientalis)*, Agg. 1889, 60; Sharpe, Cat. B. XVII, 1892, 33, 36 *(E. laetior, E. australis)*, 38 *(E. calonyx)*; Dresser *XVII, a III (E. orientalis).*

Figures and descriptions. Dresser *XVII, a III*; Gould, B. Austr. II, pl. 17 *(E. pacificus)*; Sharpe l. c. pl. II, fig. 1 *(E. orientalis)*, fig. 2 *(E. calonyx)*; Legge *a 2*; Salvad., ll. cc.; Meyer, Mitth. Z. Mus. Dresden 1875, I, 19; W. Blas. *11*; etc.

Skeleton. Eyton, Blanchard and Fürbringer have figured the skeleton or parts of it.

Adult. General colour above brownish French-green, becoming dark olivaceous seal-brown no top and sides of head, chin, and sides of neck, washed with bluish on the scapulars, innermost quills and upper tail-coverts; around orbital region and forehead blackish; wing-coverts strongly washed with cerulean-blue; quills black washed on their outer webs with cyanine-blue (except the innermost ones which are concolourous with the scapulars), the primaries crossed about their middle length by a broad band of pale blue, not seen on the outer web of the first primary; tail black, washed with cyanine-blue, most strongly towards its basal part; on throat an ill-defined patch of French-blue washed with mauve; under-parts, from breast downwards, light sea-green, the blue tint in it being strongest on the abdomen; quills below (except for the band of pearl-blue) black, the inner webs hyacinth-blue for the most part (Great Sangi, C 838). "Iris light brown; bill sealing-wax red, tip black; feet brown-red" (Platen *12*).

Sexes. Similar.

Young. Differs from the adult in being duller in colour and in having a black bill, and in wanting the bright blue patch on the throat, which is greenish, a little duller than the abdomen (Sharpe).

Measurements (8 adult specimens: Celebes and Great Sangi — 5 dated April, July). Wing 180—194; tail 96—105; tarsus 17; bill from nostril 16.5—18 mm.

Eggs. India. Very broad oval, pure white and faintly glossy; 34—36 × 29—29.5 mm (Oates, Hume's Nests and Eggs Ind. B. III, 37); Australia *(E. australis)*, two or three in number, dull white, rather glossy, sometimes variable in form: 36.8×26.7 oblong, 34×27.9 roundish (North, Nests and Eggs Austr. B. 35 pl. XIV fig. 1); three, sometimes four eggs, beautiful pearly white, considerably pointed at the smaller end (Gould.).

Nest. Breeds in holes in trees: no nest, eggs laid on a few chips of rotten wood — India (Bourdillon in Oates, l. c.); no nest, eggs laid on the dust formed by the decayed wood — Australia (Ramsay in North l. c.).

Breeding season. In South India nest found March 17th and April 20th, in the Himalayas, May (Oates); in Australia, October (North); from September to December (Gld., Handb. B. Austr. I, 120).

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[1]) Dr. Hickson remarks: "my boys called this bird 'Kokotaka', but Meyer says that the native name is 'Tjetje'." In N. Celebes 'Tokkakak' (= 'Kokotaka?) is the name for *Coracias temminckii.*

Distribution of the species. From the Himalayas and Amoor-land southwards to Ceylon, the islands of the Bay of Bengal, throughout the East Indies and Papuasia — except the New Britain and Solomon Groups — to Victoria and South Australia, occasionally wandering to New Zealand.

On the habits of *E. orientalis*, the Broad-billed Roller, in Celebes Meyer writes: "This bird sleeps in the morning, and searches for food at midday; in the evening it flies after beetles. It is to be seen near river-banks, where it sits a long time quietly on a branch of a tree over the water, and can easily be shot, not being a shy bird". Similarly its mode of life is described by Morgan in Malabar (Str. F. 1874, II, 531), by Oates and by Davison in Burmah and Tenasserim (B. Brit. Burm. II, 71; Str. F. VI, 72), by Whitehead in Borneo (Ibis 1890, 21), by Gould in Australia. Hartert (J. f O. 1889, 364), when in Assam, watched the bird performing plays of flight above high forest during the hot hours of midday after the manner of the Roller. On the whole, however, the bird may be put down as of a sedentary disposition and almost semi-crepuscular in habits. But that it has fine powers of flight is shown indirectly by the shape of its wings, and directly by its occasionally straggling to New Zealand, a distance of upwards of 1000 miles from the nearest point of Australia. It preys upon insects — chiefly, though probably not solely, beetles — caught on the wing or on the ground; a tame specimen kept by Blyth acquired a great liking for plantains (B. Ceylon, 286). It is, as Gould remarks, a very bold bird at all times, particularly so during the breeding season; as is too often the case, however, boldness is accompanied by cruelty, and it is said, writes Gould, to take young Parrots from their holes and kill them, an observation confirmed by E. P. Ramsay, who remarks that "they not unfrequently fight with, and dispossess the *Dacelo gigas*, and I have seen them take the young of the bird and throw them out of the nest" (Pr. L. Soc. N. S. Wales VII, 46). Its note is described by Meyer as kiak, kiak, by Whitehead as kick, kick, "sounding somewhat like the noise made by coachmen to horses" (l. c.); it is also said to have a single, full, deep-toned whistle (Legge, l. c.).

The plumage in the genus *Eurystomus* is remarkably similar to that of *Coracias*. The two genera are remotely related, hence the type of plumage is probably very ancient. It is interesting in this connection to observe that the sexes are alike and that the young hardly differ from them.

Eurystomus orientalis appears to be a species in process of undergoing differentiation into numerous smaller ones, a process which is not yet complete in most quarters. As the bird is migratory both in its northern territories and in Australia there can be no doubt that its distribution has taken place by flight. The genus *Eurystomus* also occurs in Madagascar and tropical Africa, being represented there by three species nearly related to one another, but very distinct from *E. orientalis*; they are placed in a different genus, *Cornopio* by Cabanis & Heine (Mus. Hein. II, 119) and Heine & Reichenow (Nomencl. Mus. Hein.

157). It is therefore most likely that these African and Madagascar forms and the Indo-Australian *E. orientalis* are sprung from ancestors belonging to some part of Asia, Africa, or Madagascar — at all events not to Australia. *E. orientalis*, we may suppose, reached the East Indies by migration in winter from its northern haunts. Pursuing their way southwards, instead of northwards, some of them have become adapted to the different breeding-season and different period of migration of birds in Australia, and under this separation from the northern birds have begun to develop racial differences, such as we find in *the typical Falco peregrinus* and the Australian *F. peregrinus melanogenys*, and much more strongly pronounced in the Australian migrant *Merops ornatus* and the Indian migrant *M. philippinus* or in the Australian migrant *Halcyon sancta* and the East Indian resident *Halcyon chloris*. *Eurystomus crassirostris* of the New Britain Group and New Guinea and its surrounding islands, and *E. solomonensis* do not appear to intergrade with *E. orientalis* which occurs in some of the same localities as the former, this being the resident form, the other, perhaps, solely or mainly a migrant. In the Great Sunda Islands, and the Burmese countries it is the opinion of Dr. Sharpe, that a resident form, distinguishable from the migrants from the north is coming into existence, but in some localities — among them Celebes — it appears that resident birds and migrants from north and south occur together and that a certain amount of interbreeding takes place, rendering exact nomenclature impossible.

We may pause for a moment to think what theories on former physical geography a naturalist in the distant future might build up, when these races of *E. orientalis* may be supposed to have become resident and well differentiated species in India, the East Indies, Australia and New Zealand!

ORDER MACROCHIRES.

The Goatsuckers and Swifts, which catch their insect-prey on the wing (except *Steatornis* which feeds on fruit) and possess an enormous gape reaching to beneath the eyes or further, but a minute and weak bill, very long wings, small feet and tarsi.

The tail-feathers are 10 in number; there are also 10 primaries in both (see, also, Hartert, Cat. B. XVI; Gadow in Bronn's Kl. & Ord.; Blanford, Fauna Br. Ind., Birds III, 162).

FAMILY CAPRIMULGIDAE.

The Goatsuckers are crepuscular or nocturnal in habits, wearing a nocturnal plumage — soft, with the pattern broken up and vermiculate, without bright

pure tints, such as pure blue, yellow or red, but chiefly brown, grey, and dusky colours; often with "recognition marks" of white on the throat and tail. The bill is small and soft, the nasal aperture membranous and tubular, the gape very wide, reaching below the eye. Five subfamilies of the *Caprimulgidae* may be distinguished; their differences are pointed out below (p. 325) under *Lyncornis macropterus*.

GENUS CAPRIMULGUS L.

The true Goatsuckers may be recognised by their having a row of strong bristles above the gape directed forwards; no ear-tufts, a rounded tail with white patches on the outer rectrices of the male (usually absent in the female). Outer toe with four phalanges, claw of middle toe pectinated. The genus is of almost cosmopolitan distribution.

99. CAPRIMULGUS MACRURUS Horsf.

Horsfield's Nightjar.

Mr. Hartert's careful researches on the Goatsuckers offer proof that *C. macrurus* as a species should be viewed as made up of two subspecies, i. e. *the typical macrurus* ranging from Malacca to southern Australia (Ramsay) and *C. macrurus albonotatus* (Tick.) of N. India; while the territories from the foot of the Himalayas to Tenasserim produce intermediate forms. These latter might be distinguished as *C. macrurus — albonotatus*.

1. The typical Caprimulgus macrurus.

a. **Caprimulgus macrurus** *(1)* Horsf., Tr. Linn. Soc. 1821, XIII, 142; *(II)* Gld., B. Austr. 1848, II, pl. 9; *(3)* id., Handb. B. Austr. 1865, I, 100; *(4)* Salvad., Cat. Ucc. Borneo 1874, 117; *(5)* Brügg., Abh. Ver. Bremen 1876, V, 464; *(6)* Salvad., Orn. Pap. 1880, *I*, 528 (pt. — non ex India); *(7)* W. Blas., J. f. O. 1883, 115, 122, 136; *(8)* Ramsay, Tab. List 1888, 2; *(9)* North, Nests and Eggs Austr. B. 1889, 29; *(10)* Salvad., Agg. Orn. Pap. 1889, I, 62; *(11)* Sharpe, Ibis 1890, 22, 283, 288; *(12)* Everett, J. Str. Br. R. A. S. 1889, 153; *(12bis)* Hagen, T. Ned. Genoots. 1890, (2) VII, 142; *(13)* Hartert, Kat. Vogels. Senckenb. Mus. 1891, 120; *(14)* id., Cat. B. XVI, 1892, 537 (pt. non ex Tenasserim, Burma); *(15)* id., Ibis 1892, 281—283; *(16)* Hose, ib. 1893, 406; *(17)* Mad., Aquila 1894, 97; *(18)* Bourns & Worces., B. Menage Exp. 1894, 34; *(19)* Blanf., Faun. Br. Ind. B. III, 1895, 188, pt.; *(20)* Hart., Nov. Zool. 1896, 175, 562, 593; *(21)* id. Tierreich, 1897, I, 54 *(typicus)*.

b. **Caprimulgus salvadorii** *(I)* Sharpe, P. Z. S. 1875, 99, pl. XXII, fig. 1.

For further synonymy and references see Salvadori *a 6*, *a 10*; Hartert *a 14*.

Figures and descriptions. Gould *a II*, *a 3*; Sharpe *b I*; Salvadori *a 6*; North *a 9* (egg); Hartert *a 14*.

Adult male. Upper surface pale brown, finely vermiculated with greyish, especially on the top of the head; centre of crown longitudinally streaked with brownish black; an indistinct fulvous band across the hind neck; back and rump marked with deep

brown; scapulars and wing-coverts with more or less bright buff patches, the former mostly velvety brownish black; first primary deep brown, a large spot on the inner web and a broad white patch across both webs of the next three primaries, often an indication of a white spot on the fifth quill; secondaries deep brown, with narrow interrupted rufous bars, the two outer pairs of rectrices largely tipped with white, these tips varying in extent, being generally about 2 inches (50 mm) in length; chin and sides of throat rufous brown, finely barred with blackish brown; throat with a very large white spot, bordered at the lower part with deep black; abdomen rufous buff, barred with brown. Total length about 292 mm; wing 180—198 (about 190 on an average); tail 142—160; tarsus 17.8, feathered in front for almost its whole length (Hartert *a 14*). Iris blackish brown; bill black; feet and claws reddish brown (Gould *3*).

Adult female. Differs from the adult male in having the outer web of the first primary spotted with rufous, in having pale rufous marks on the primaries instead of white ones, in the tips to the outer rectrices being less in extent and tinged with buff or rufous, speckled with brown on the tip of the outer web (Hartert *a 14*).

Young. The markings less developed, the young male has the white patches on the primaries and rectrices tinged with rufous and less in extent. The nestling is covered with buffy down (Hartert *a 14*).

Distribution. Almost the whole of Australia (Ramsay *8*); New Britain; Aru; New Guinea; Waigiou; Halmahera; Obi; Ceram; Buru; Celebes — Gorontalo; Timorlaut; Timor; Lombok; Java; Borneo; Palawan; ? Philippines; Sumatra; Malacca (Salvad. *a 6, a 10*, Brüggem. *a 5*, Everett *a 12*, Hartert *a 14, a 15*); Saleyer and Djampea (Everett *a 20*); Sumbawa (Doherty *a 20*).

2. Caprimulgus macrurus albonotatus (Tick.).

c. **Caprimulgus albonotatus** *(1)* Tick., J. A. S. B. 1842, XI, 580; *(2)* Jerd., B. Ind. 1862, I, 194; *(3)* Hume, Str. F. 1875, III, 45; *(4)* id., ib. 1878, VI, 58; *(5)* Hartert, Cat. B. XVI, 1892, 540 (subsp.) partim; *(6)* Blanford, Fauna Br. Ind. B. III, 1895, 188, pt.

d. **Caprimulgus macrurus albonotatus** *(1)* Hartert, Ibis 1892, 282; *(2)* id. Tierreich, 1897, I, 54.

Diagnosis. Differs from the *typical macrurus* in being altogether a larger bird (wing 229 mm, against 197—203 in *macrurus*), both above and below altogether a lighter coloured and more buffy bird, with broader white or buffy or creamy white margins to the scapulars and wing feathers, and with the whole lower parts comparatively uniform; whereas in *macrurus* the breast is much darker and contrasts strongly with the much paler abdomen (Hume *c 4*).

Variation. Specimens from the plains of North-western India are very light coloured; the markings paler brown (than in the *typical macrurus*), the scapulars less brilliantly marked, the dark spots on the crown less numerous, narrower, and more confined to the middle of the crown; wings very long; lower parts very strongly tinged with pale sandy rufous. Wing 203—218 mm; tail 165—178 [as against 180—198 and 142—160 respectively in the *typical macrucus*], (Hartert *c 5*).

Distribution. India throughout the Himalayas at low elevations, in the North-west Provinces, Bengal, Chutia Nagpur, and Raipur, and in Burma (Blanford).

3. Caprimulgus macrurus — albonotatus.

e. **Caprimulgus nipalensis** [Hodgs., Icon. ined. in Mus. Brit.], *(1)* Hartert, Ibis 1892, 283.

f. **Caprimulgus macrurus** *(1)* Hume, Str. F. 1878, VI, 58; *(2)* Oates, B. Brit. Burmah 1883,

II, 20; *(3)* id., ed. Hume's Nests & Egg. Ind. B. 1890, III, 45; *(4)* Hartert, Cat. B. XVI, 1892, 537, pt.; *(5)* id., Ibis 1892, 282, 283 (intermediate forms).

g. **Caprimulgus albonotatus** *(1)* Oates, B. Brit. Burmah 1883, II, 19, ? pt.; *(2)* Hartert, Cat. B. XVI, 1892, 541 (ex Mont. Himalaya).

Distribution. Himalayas, mountains of Burmah and Assam, Tenasserim, Siam and China.

Variation. On comparing good series of birds from Tenasserim, Burmah, and Assam it has been found that in the latter localities many intermediate phases between the *typical macrurus* and *macrurus albonotatus* occur, so that it is impossible to draw any line between the two forms. Specimens from the foot of the Himalayas also may be regarded as intermediate between the true *albonotatus* and *macrurus* (after Hartert *f 5*).

"Specimens from Borneo", says Mr. Hartert, "are very dark and small: . . . specimens from Waigiou and Aru are perfectly similar to those from North Borneo; they belong to the very dark blackish island-form".

Egg (of the species). Australia — 2 in number, light rich cream-colour, fading to whitish after being emptied, clouded all over with fleecy markings of pale slaty lilac, which appear as if beneath the surface of the shell; 28 × 21 mm (Ramsay *a 9*); West Java — 2, elliptical, faint white tending to yellowish, marked with scattered spots, mostly not large, of reddish grey-brown and ash-grey, the latter in particular numerous towards the blunt end, though not forming an appreciable circlet; 28—30 × 21—22 (Bernstein, J. f. O. 1859, 182); Tenasserim — 2 in number; somewhat cylindrical ovals; shell very fine and smooth, excessively close-grained, very thin; delicate creamy pink, everywhere rather thinly spotted, streaked, clouded, and marbled with very pale, somewhat brownish purple, and very pale subsurface-looking inky grey; (ten specimens) 29—33 × 20—23 mm (Hume *f 3*).

Nest. None — the eggs are laid upon the bare ground: Australia (Rams. *a 9*); Tenasserim (Bingham *f 3*); Java — a slight depression, upon a few bamboo-leaves (Bernstein l. c.).

Breeding season. Tenasserim — March, April (Bingham *f 3*).

The right of *C. macrurus* to be included in the Celebes avifauna rests upon two specimens, obtained by von Rosenberg or Riedel in Gorontalo. These latter were determined by Brüggemann, who pointed out that Lord Walden's specimen of a *Caprimulgus* obtained by Meyer in Celebes appeared to be identical with them. In this Brüggemann was in error; Meyer's specimen has since been made the type of a distinct species, *Caprimulgus celebensis* Grant. Mr. Everett obtained *C. macrurus* in Saleyer and Djampea. A nestling from the latter island shows that the species breeds there.

It is probable that *C. macrurus* is not strictly stationary; the Nightjars feed upon insects, which become scarcer at certain seasons, when local movements on the part of the birds will probably take place. Such, in particular, should be the case in the southern parts of Australia. Like the Owls, the Celebes Nightjars appear to have nothing to say on the question of the former distribution of the land and water round about; like them they appear from their nocturnal habits to be specially liable to be carried across straits of the sea by winds, and if in addition the species has migratory tendencies its range will be likely to become all the wider. Whereas, for instance, one finds two distinct

species of the Woodpecker *Microstictus*, one occurring in North, the other in South Celebes, the two subspecies of *Caprimulgus macrurus*, which appear to be of about equal value, are found one in India, the other in the East Indies and Australia.

♱ * 100. CAPRIMULGUS CELEBENSIS Grant.

Celebesian Nightjar.

Plate XI.

a. **Caprimulgus** sp. *(1)* Wald., Tr. Z. S. 1872, VIII, 115.

b. **Caprimulgus manilensis** *(1)* Hartert, Cat. B. XVI, 189?, 544, partim.

Caprimulgus celebensis *(1)* Grant, Ibis 1894, 519; *(2)* Hartert, ib. 1896, 371; *(3)* id. Tierreich 1897, I, 53.

"Trio", Lembeh (Nat. Coll.).

Diagnosis. This species, with its Philippine ally *C. manilensis*, differs, according to Hartert, from *C. macrurus* chiefly in the smaller extent of the white spots on the primaries and of the white tips of the lateral rectrices, especially in the latter (white tips of two outer pairs about 25 mm broad, in *macrurus* about 50 mm). Abdomen brownish buff, barred with dark brown, but not so regularly as in *C. macrurus*, the broader buff tips of the feathers producing a more spotted appearance.

Measurements. Total length 305 mm; wing 180; tail 147; tarsus 20; mid. toe with claw 26.7; culmen 21.6; longest rictal bristle 35.6 (Grant *1*).

Distribution. Celebes (Meyer *a 1, b 1, 1*); Lembeh Id. (Nat. Coll. in Dresd. Mus.).

A single specimen of this species now in the British Museum was obtained by Meyer in Celebes — probably in the Minahassa — in 1870—1871. It was not immediately determined by Lord Walden, and Brüggemann having received the foregoing *C. macrurus* from Gorontalo expressed the opinion that Meyer's example would prove to be the same, but he apparently overlooked Walden's determination of the specimen as *manilensis* in a subsequent work *(a 1)*. Walden's decision was confirmed by Mr. Hartert, but Mr. Ogilvie Grant who has recently had occasion to compare the Celebesian specimen with Philippine ones, remarks: "How the bird from Celebes came to be identified with *C. manillensis*, G. R. Gray, by both Lord Tweeddale and Mr. Hartert I am at a loss to understand, for two more totally distinct species of Goatsucker can hardly be imagined. In the Celebes bird the rictal bristles are much longer and stouter than in any other species of *Caprimulgus*, and extend far beyond the end of the culmen, the longest ones being about once and a half the length of the culmen from its base, and more than twice as long as the exposed part of the culmen. This character alone is sufficient to distinguish the Celebes bird at a glance, for in *C. manillensis* the bristles are very much finer and are very little longer than the culmen. The example from Celebes (apparently not quite adult, the primaries being tipped with buff) is most nearly allied to *C. andamanicus* Hume, the two outer tail-feathers being rather narrowly tipped on both webs with white, the white extremity being less than an inch in length;

the white spots on the inner webs of the primaries are small, but clearly defined".

A second specimen was killed on Lembeh Island in March, 1895, and sent to the Dresden Museum; we give a figure of it. We find Mr. W. R. Ogilvie Grant's statement as to its distinction from *C. manilensis* couched in too energetic language; instead of — as his words might lead the reader to suppose — belonging almost to two different genera, the two forms seem to us to be so closely allied as almost to endanger the specific distinction of *C. celebensis*, and to awake a doubt as to whether it may not ultimately have to be reduced to the rank of a subspecies.

101. CAPRIMULGUS AFFINIS Horsf.

Allied Nightjar.

Caprimulgus affinis *(1)* Horsf., Tr. L. S. XIII, 1821, 142; *(2)* Sclat., P. Z. S. 1863, 212; *(3)* Walden, Tr. Z. S. 1872, VIII, 114; *(4)* Salvad., Cat. Ucc. Borneo 1874, 115; *(5)* Tweedd., P. Z. S. 1877, 691; *(6)* Vorderman, Nat. Tdschr. Ned. Ind. 1883, XLII, 54; *(7)* Guillem., P. Z. S. 1885, 504; *(8)* Tristr., Cat. Coll. B. 1889, 112; *(9)* Everett, J. Str. Br. R. A. S. 1889, 153; *(10)* Vorderman, Notes Leyden Mus. 1891, 25; *(11)* id., N. T. Ned. Ind. 1891, L, 448; *(12)* Hartert, Ibis 1892, 280; *(13)* id., Cat. B. XVI, 1892, 549; *(14)* Büttik., Zool. Erg. Weber's Reise Ost-Ind. 1893, III, 292; *(15)* Vorderm., N. T. Ned. Ind. 1895, LIV, 336; *(16)* Hart., Nov. Zool. 1896, 158, 549, 570, 595; *(17)* id., ib. 1897, 163; *(18)* id., Tierr. 1897, I, 50.

a. **Engoulevent des Roseaux** *(1)* Hombr. & Jacq., Voy. Pôle Sud 1846, pl. 21, fig. 2.

b. **Caprimulgus arundinaceus** *(1)* Bp., Consp. 1850, I, 60; *(2)* Jacq. & Pucher., Voy. Pôle Sud, Texte 1853, 93; *(3)* Salvad., Cat. Ucc. Borneo 1874, 116.

c. **Caprimulgus faberi** *(1)* Meyer, Isis, Dresden 1884, 20 (fide Hartert).

For further synonymy and references see Hartert *13*.

Descriptions. Hombron & Jacquinot *a 1*; Walden *3*; Vorderman *6*; Hartert *13*; Meyer *c 1*.

Adult [male]. Ground-colour above, including upper surface of tail, broccoli-brown, thickly vermiculated, sprinkled, and spotted with sepia, clove-brown, and black, the crown, nape and mantle being most strongly marked — not streaked — with black, the scapulars marked with broken spots of light cinnamon; first four primaries blackish brown, outer webs paler, across their middle length a broad white band, only seen on the inner web of the first quill, on both webs of the other three; remaining quills (except the innermost ones which share the colour of the back) and greater wing-coverts brownish black barred with tawny-cinnamon, the bars being somewhat broken up with black; outermost tail-feather white, base of inner web barred with black and pale tawny-cinnamon; the next, white, mottled with bars of black and light tawny-cinnamon towards its base, most extensively on the inner web; general colour of under surface pale cinnamon, closely sprinkled and barred with broken markings of dark sepia on throat and breast, and rather regularly marked with narrow bars of sepia on the remaining under parts; under tail-coverts uniform cinnamon-whitish; on each side of throat a white patch (Java, Nr. 8898).

Adult female. Differs from the male in having no white whatever on the tail, the rectrices being banded with pale rufous grey and dark brown, paler on the tips (Hartert *13*).

Variation. The spots on the throat vary in size in both sexes and are sometimes almost confluent, often not pure white but buff, this latter colour being apparently a sign of immaturity, as also is the buff colour of the white patches on the primaries (Hartert *13*).

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (Nr. 8898) Java	167	98	18	7
b. (Nr. 13732) Sumatra (type of *C. faberi*)	166-67	107	—	—

Egg and breeding habits. Unknown[1]).

Distribution. Sumatra (Raffles *13*, Faber *c 1*); Java (Horsf. *1*, Vorderman *6*); Billiton (Vorderman *10*, *11*); Banjermasin, S. Borneo (Hombron *b 2*, Mottley *2*, *4*, *9*); Celebes (Meyer *3*, *13*, Everett *16*, Doherty *17*); Lombok (Wall. *3*, *4*, *13*, Doherty *16*); Sumbawa (Guillem. *7*, Doherty *16*); Flores (Weber *14*); Timor (Wall. *13*).

A single specimen only of this species obtained by Meyer was the sole proof of its occurrence in Celebes till September, 1895, when a second was killed at Macassar by Everett and determined by Hartert *(16)* as a perfectly adult male. Later two further specimens were obtained by Doherty in West Celebes. Meyer's example is now in the British Museum and is marked by Hartert as immature.

The nearest ally of *C. affinis* is *C. griseatus* (Wald.) of Luzon, a rare bird in collections, which will probably prove to be only subspecifically distinct from *C. affinis* when the intermediate localities have provided ornithologists with specimens. Walden (Tr. Z. S. 1875, IX, 326) speaks of this form as intermediate in dimensions between *C. affinis* and *C. monticola* of India and South China to Tenasserim, but not yet known, apparently, from the intermediate Malay Peninsula. *C. monticola* is, however so much bigger than the other two that it is hardly likely that it will be found to intergrade with them.

GENUS LYNCORNIS J. Gd.

Distinguishable from *Caprimulgus* by having no rictal bristles, no white on the tail-feathers; the parietal plumage lengthened so as to form "ear-tufts". Outer toe with four phalanges, claw of middle toe pectinated. Hartert (1897) recognises 6 species ranging from N. E. India to New Guinea.

102. LYNCORNIS MACROPTERUS Bp.

Celebesian Eared Nightjar.

Plate XI.

Lyncornis macropterus [Temm., Mus. Leyd.], *(1)* Bp., Consp. 1850, I, 62; *(2)* Wall., Ibis 1860, 141; *(3)* Gray, HL. 1869, I, 605; *(4)* Walden, Tr. Z. S. 1872, VIII, 47,

[1]) Dr. Kutter (J. f. O. 1882, 175) says that the egg of *C. griseatus* of the Philippines is very similar to that of *C. affinis* said to be described by Baron König-Warthausen under *C. bisignatus* (J. f. O. 1868, 373).

112; *(5)* Rosenb., Malay. Archip. 1878, 271; *(6)* W. Blas., J. f. O. 1883, 136; *(7)* Guillem., P. Z. S. 1885, 549; *(8)* Tristr., Cat. Coll. B. 1889, 114; *(9)* Hartert, Cat. B. XVI, 1892, 605; *(10)* M. & Wg., Abh. M. Dr. 1895, Nr. 8, p. 8; *(11)* iid., ib. 1896, Nr. 1, p. 5; *(XII)* Meyer, Vogelsk. 1897, pl. CCXIII; *(13)* Hart., Tierr. 1897, I, 25.

a. **Caprimulgus macropterus** *(1)* Schl., Handl. d. Dierk. 1857, I, 223; *(2)* Finsch, Neu-Guinea 1866, 162.

"Tulio", ? Gorontalo, Rosenb. *5.*

"Trio", Gorontalo Distr. (or Minahassa), Guillem. *7.*

"Kokotaka", Minahassa, Nat. Coll.

"Burong malas", Malay, iid.

"Burong malam" (Evening-bird), Malay, Manado, Meyer MS.

Figure and descriptions. Meyer *XII* (skel.); Bonaparte *1*; Hartert *9.*

Adult [nearly]. General colour above brownish black, more dusky on the wings, the whole varied with cinnamon and light tawny-olive; entire head above very finely vermiculated with black and russet, marked with large scattered shield-shaped spots of sooty black narrowly bordered with russet; behind the head the feathers broadly fringed with tawny-olive, forming a collar; hind neck, mantle and middle of back sooty black, somewhat vermiculated with cinnamon on the mantle and back; rump, upper tail-coverts and tail more strongly speckled and vermiculated with cinnamon, five or six narrow broken bars of which colour are discernible on the tail; on the scapulars and inner quills the cinnamon tint prevails over the black, scapulars marked with some large shield-shaped spots of black; quills dusky, speckled with tawny-olive in the form of ill-defined bars; upper wing-coverts speckled with russet; superciliary region, ear-coverts, malar region and chin, black, barred with russet; across the throat a broad white band; upper breast and sides of neck black, the feathers fringed with russet; below this a broad band of almost clear cinnnamon; remaining under parts cinnamon, brokenly barred and speckled with black, the bars being well formed on the flanks; under wing-coverts barred with blackish and cinnamon (near Tondano, Aug.—Sept. 1892, Nat. Coll. — C 10794). Iris brown; bill reddish brown; feet clear brown (Guillem. *7*).

Variation. The species varies considerably; in six other specimens before us the cinnamon bars on the tail are much broader and better defined than in that described, and the upper surface paler — more or less. One specimen (C 12868) is almost entirely without spots on the crown; this is perhaps the oldest. The white patch on the throat also varies in extent.

Sexes. Apparently similar.

Measurements (7 specimens). Wing 252—262 mm; tail 151—161; bill from nostril 7—8; tarsus 17.5 ca.

Egg. "On 4th April, 1895, a hunter brought us in Tomohon a female and a completely smashed egg, which he had found lying simply on the ground. The fragments showed a reddish white colour with rather dark red-brown spots" (P. & F. Sarasin *11*).

Distribution. Celebes, Northern Peninsula: — Minahassa (Wallace *2*, *9*, v. Musschenbroek, etc.), Gorontalo Distr. (Riedel, Mus. Dresd., Guillemard *7*).

Mr. Wallace speaks of this species as abundant about Manado, where it appears soon after sunset, chasing insects with rapid evolutions. Guillemard found it especially plentiful near Likoupang on the north coast, and v. Rosenberg, whose notes have special reference to Gorontalo, mentions it as very common, particularly by river-banks. Nevertheless it has escaped many collectors, and

has not been recorded from any part of Celebes but the Northern Peninsula. It is closely related to the Philippine species of *Lyncornis*, especially *L. mindanensis*, its nearest neighbour, which, however, as Mr. Hartert shows, differs in having the abdomen much more evenly barred. Should *L. macropterus* prove to be confined to North Celebes, it might be reasonably inferred that the species is a recent immigrant from Mindanao.

The genus *Lyncornis* is known to range from Burmah to Java, Celebes and the Philippines, occurring again in Salawatti and New Guinea.

Although the Goatsuckers of Celebes appear to have nothing important to say on the past conditions of this island, the geographical distribution of the Goatsuckers of the world in general affords several points of interest. In 1866 (P. Z. S. 127) Sclater divided the *Caprimulgidae* into 3 subfamilies:

1. *Podarginae*, most typical of Australia, in which the genus *Nyctibius* of South America to Jamaica and Mexico was included;
2. *Steatornithinae*, the frugivorous Cave-goatsucker of S. America from Guiana to Peru;
3. *Caprimulginae*, the typical Goatsuckers, of which S. America is by far the richest in genera, after which comes Africa.

Later, Garrod's anatomical researches led him to the conclusion that *Steatornis* should be separated as a family for itself (P. Z. S. 1873, 534; Coll. Papers, 186). In 1885 (P. Z. S. 153), Beddard divided the *Caprimulgidae* into four subfamilies: 1. *Steatornis*; 2. *Podargus* and *Batrachostomus*; 3. *Aegotheles*; 4. *Caprimulgus*, *Chordeiles*, and *Nyctidromus*. This anatomist differs in so far from Garrod as to conclude that "*Podargus*, *Batrachostomus* and *Aegotheles* are much nearer to *Steatornis* than to *Caprimulgus*, but should be placed in an intermediate position". Recently Hartert has separated these groups of forms into three different families with subfamilies as follows:

1. *Caprimulgidae.*
   - *a. Caprimulginae*, chiefly South American, 11 peculiar genera being found in America and Jamaica, 3 in Africa, 1 in the Oriental Region and New Guinea, 1 in the Australian Region, while 1 *(Caprimulgus)* is common to all, though sparsely represented in the direction of Australia.
   - *b. Nyctibiinae*, tropical parts of S. America to Jamaica and Mexico. (Sclater has placed this subfamily in Hartert's *Podargidae.*)
2. *Podargidae.*
   - *a. Podarginae*, two genera, the one confined to Australia and Papuasia, the other to the Oriental Region from the Himalayas to Java and the Philippines.
   - *b. Aegothelinae*, confined to Australia and Papuasia, with one species in New Caledonia.
3. *Steatornithidae.*
   South America from Guiana to Peru.

Although we should prefer to recognise one family of five subfamilies, rather than three families with two subdivisions as Mr. Hartert does, — for the *Nyctibiinae* connect the *Caprimulgidae* with *Podargidae*, from which again the

Steatornithidae, according to Mr. Beddard, are not far removed — it is nevertheless well to be made aware of the differences which separate the several groups. Some of these differences may be recapitulated as follows:

	Caprimulginae	*Nyctibiinae*	*Podarginae*	*Aegothelinae*	*Steatornithinae*
Phal. in outer toe	Four	Five	Five	Five	Five
Claw of middle toe	Pectinated	Not pectinat.	Not pectinated	Not pectinated	Not pectinat.
Oil-gland . . .	Pres. (small)	Present?	Absent	Absent	Present
Powd.-dwn. patches	Absent	Present	—	—	—
Syrinx	Tracheo-bronchial	—	Approximates bronch. structure	Tracheo-bronchial	Bronchial
Stern., nr. of incis.	One pair	Two pairs	Two pairs	Two pairs?	One shallow pair
Palate	Aegitho-gnathous [1])	Schizognath.	Desmognathous	Desmognath.?	Desmognath.
Biceps-slip . . .	Present	—	Absent	Absent	Absent
Fem.-caud. muscle	Present	—	Present	Present	Absent
Caeca	Present	—	Present	Absent	Present
Food	Insectivorous	Insectivorous	Insectivorous	Insectivorous	Frugivorous
Eggs	Coloured	—	Pure white	Do., or palely striated	Pure white
Nest	None, eggs laid on ground	—	Flat, of small sticks on horiz. branches	In hollow trees	In caves

In external appearence the *Podarginae* are very like the *Nyctibiinae*; structurally they differ in at least one very important point, i. e. the structure of the palate. Nevertheless in this respect also the two subfamilies approach one another more nearly than the other *Caprimulgidae*: "we have almost a transition to the Desmognathous structure in *Nyctibius*" (Huxley, P. Z. S. 1867, 456).

It is remarkable that Australia, the part of the world almost the most remote from South America, should furnish the link, *Podargus*, between the South American forms *Nyctibius* and *Steatornis*, which would otherwise be best separated as families for themselves. The distribution of the *Caprimulgidae* may be compared with that of the *Struthiones*. But it seems to have taken place at two distinct epochs; — an earlier one when the dispersal of the main groups took place, and a later one which determined that of the subfamily, *Caprimulginae*. The latter group from its great richness in genera, may be supposed to have been longer in America than elsewhere, the various structural modifications being a matter of time. The Palaearctic Region possesses only the cosmopolitan genus *Caprimulgus*, which most likely entered it from America in comparatively recent times; while *Lyncornis* and *Eurostopodus* and the peculiar *Caprimulginae* of Africa seem to have proceeded south and become isolated after an exodus from America at an earlier period.

[1]) cf. Hartert, Ibis 1896, 370.

The *Caprimulgidae* are again of interest, as Mr. Hartert shows, from the high development of protective coloration seen in them. "The colours of the *Caprimulgidae* . . . vary much according to the surroundings, and especially in relation to the soil. So, as a rule, we find yellow, buff, and isabelline-coloured species in sandy deserts and desert-like localities, darker species in more wooded countries, and richly coloured ones in tropical forests. But even the same species varies much, according to the soil that it frequents, and therefore several species readily form more or less well-defined local races, often well worthy of subspecific rank. In many cases, of course, as usual, we do not understand the reasons why a certain form is differentiated, because we have so little knowledge of the influence of climate, the amount of rainfall, the surroundings, and the food" (Ibis 1892, 275).

The need for protective coloration in so defenceless a bird as the Goatsucker which rests on the bough of a tree, or on the ground, in the day-time and seeks its insect-food at night, is manifest. Its curious habit, also, of sitting along the bough, instead of across it like other birds, is no doubt a protective measure. Its plumage of dark brown and grey varied with all sorts of patches, spots and vermiculations is admirably adapted to conceal it when lying lengthways on a bough covered with lichens, moss, brown bark and the moving shadows of leaves. So long as it remains thus at rest it is an inconspicuous object; the white outer tail-feathers, wing-band and throat-patch of many species of the *Caprimulgidae* are then hidden by overlying feathers or by its resting-place below, but so soon as it takes to wing these white patches must at once become striking marks. They exemplify particularly well the "recognition markings" of Wallace.

It is a curious fact that the Owls, also nocturnal birds, are on the whole much like the Goatsuckers in coloration. In their case, too, protective coloration may be reasonably urged to account for the fact, though they are not at all defenceless birds like the Goatsuckers. It is well known how a troop of Sparrows delight in mobbing an Owl in the day-time, as indeed also an escaped Parrot, Canary, or such like, and for the destruction of Birds of Prey and Crows one of the most irresistible lures is an Eagle Owl, which, when seen fastened in the open, will have a bad time from the beaks and claws of the diurnal Birds of Prey and Crows, if these are not shot down as they come by the hunter under cover close by. The plumage of the Owls, likewise resembles that of the Goatsuckers in being soft, and their flight is likewise noiseless, a fact explained in the case of the Owls by the need they have of approaching their prey without being heard. In the case of the Goatsuckers this explanation does not suffice — nor indeed does it in the case of the insectivorous Owls. The Goatsuckers, as a rule, like their allies the Swifts, catch their insect-prey on the wing, but the flight of the Swifts is rushing and loud.

Quiet flight therefore cannot be of any vital importance; a wide mouth,

speed, and dexterity in turning seem to be the only essentials. It may also be added that insects are much less sensitive to sound than birds and mammals, or have quite different perceptions of it. The cause may be quite different. The manifest influence of light, shelter, and exposure on the plumage will be found referred to many times in earlier and later pages *(Loriculus, Hierococcyx crassirostris, Graucalus, Coracias)*; the converse of sunlight (darkness) must of course also have effect, and in the soft glossless plumage of the Owls and Goat-suckers it may be that we see the influence of the want of light upon the feathers of birds. Night falls upon other birds also, but these are then sleeping and their vital energies are less active or otherwise employed.

FAMILY CYPSELIDAE.

The Swifts are diurnal birds of aerial habits, taking and devouring their insect-food on the wing. The bill is small, the nostrils membranous, the gape deep and wide, extending to below the eyes, the palate aegithognathous; the secondaries are much reduced, the primaries very long, 3—4 times the length of the secondaries or more; there are said to be no median wing-coverts; the legs are very short. The keel of the sternum is very high, the posterior margin unnotched. Three subfamilies have been distinguished — all occurring in the Celebesian Province: the *Cypselinae* with the three anterior toes consisting each of three phalanges, the tarsus feathered; the *Chaeturinae* with the tarsus bare and the toes normal, i. e. the middle one with 4, the outer with 5 phalanges; the *Macropteryginae* with fenestra in the hinder margin of the sternum, and the tail extending about to the tips of the wings and deeply forked.

GENUS CYPSELUS[1]) Ill.

The typical Swifts may be recognised by the toes which are naked and all directed forwards. Hartert (1892) recognised 16 species, of cosmopolitan distribution. Many of them migratory. They usually breed in holes in buildings or rocks, not forming a nest, laying white eggs.

+ 103. CYPSELUS PACIFICUS (Lath.).

Australian Swift.

a. **Hirundo pacifica** *(1)* Lath., Ind. Orn. Suppl. 1801, 58.
b. **Cypselus australis** *(1)* Gld., P. Z. S. 1839, 141; *(II)* id., B. Austr. 1848, II, pl. 11; *(III)* Diggles, B. Austr. 1877, p. 20, pl. 20.

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[1]) The generic name *Micropus* of Meyer & Wolf (Taschenb. 1810, 280) antedates *Cypselus* of Illiger (Prodr. 1811, 230) by a year. By rule 10 of the Stricklandian Code the name *Micropus* is to be rejected,

c. **Cypselus vittatus** *(1)* Jard. & Selb., Ill. Orn. 1843, IV, pl. 49; *(2)* Swinh., Ibis 1860, 48, 429; 1861, 254, 328; *(3)* id., ib. 1863, 253; *(4)* id., P. Z. S. 1863, 263; *(5)* Blyth, Ibis 1863, 263.

Cypselus pacificus *(1)* Blyth, J. A. S. B. 1843, XIV, 212, 548; *(2)* Scl., P. Z. S. 1865, 599; *(3)* Gld., HL. B. Austr. 1865, I, 105; *(4)* Swinh., Ibis 1870, 89; *(5)* Blyth, ib. 161; *(6)* Jerd., ib. 1871, 355; *(7)* Tacz., J. f. O. 1872, 351; *(8)* Swinh., Ibis 1874, 435; *(9)* Salvad., Ucc. Borneo 1874, 119; *(10)* Hume, Str. F. 1875, 14, 43; *(11)* Swinh., Ibis 1876, 331; *(12)* Hume & Davis., Str. F. 1878, VI, 48; *(13)* Salvad., Orn. Pap. 1880, I, 534; *(14)* Hume, Str. F. 1880, IX, 246; 1882, X, 185; *(15)* Oates, B. Brit. Burmah 1883, II, 1; *(16)* Ramsay, Tab. List 1888, 3; *(17)* Seeb., B. Japan 1890, 177; *(18)* Tacz., Faun. Orn. Sib. Orient. 1891, I, 168; *(19)* Pleske, Mél. Biol. Ac. Petersb. 1892, XII, pt. 2, 294; *(20)* Oust., Nouv. Arch. Mus. 1893, 138; *(21)* id., ib. 1894, 112; *(22)* Styan, Ibis 1894, 334; *(23)* Blanf., Faun. Br. Ind. B. 1895, III, 167.

d. **Micropus pacificus** *(1)* Stejn., Bull. U. S. Nat. Mus. Nr. 29, 1885, p. 321; *(2)* Hartert, Kat. V. Mus. Senckenb. 1891, 119; *(3)* id., Cat. B. XVI, 1892, 448..

e. **Apus pacificus** *(1)* Hartert, Tierreich 1897, I, 86.

For further synonymy and references cf. Salvad., *13*; Hartert *d 3*.

Figures and descriptions. Gould *b II*; Jardine & Selby *c I*; Diggles *b III*; Hume *10*; Salvadori *13*; Oates *15*; Hartert *d 3*; Taczanowski *18*; Blanford *23*.

Adult. Seal-brown, tail darker; across the uropygium and flanks a broad white band with dark shaft streaks, the feathers of the upper surface narrowly fringed with white; chin and throat white with dark shafts streaks; remaining under parts brown, paler than the upper surface, each feather broadly fringed with white (Ussuri, ♀, 25. V. 1884 — C 10426). Irides brown; eyelids pinkish grey; bill black; inside of mouth fleshy; feet pinkish; claws dark horny (Oates *10*).

Measurements.	Wing	Tail	Tarsus	Bill from gape
a. (C 10426) ♀ ad. Ussuri, Manchuria	190	83	11	18
b. (C 10509) ad. Cape York, Australia.	181	76	—	19 c.
c. (Nr. 2572) juv.? Siao, Sangi	167	72	—	19 c.

Eggs. China: 2 in number; pinkish white until blown, then becoming unpolished white. Average 20.5 × 17.8 mm (Swinh. *8*). 20 × 16 mm (Nehrk. MS.). See, also, Tacz. *18*.

Nest. In holes and crannies of the rocks; a shallow saucer, nearly 4 inches in greatest breadth, of refuse-straw and a few bits of catkins and feathers, all strongly agglutinated with a gelatinous matter, doubtless the bird's saliva. Another nest, perhaps the accumulation of six years, consisted of six nests one placed above another and strongly glued to it (Swinh. *8*).

Breeding season. China, breeding in numbers, June 22nd.

Distribution. Southern Siberia from the Yenesei to Japan (Seebohm *17*); Tibet (Bonv. & Pr. d'Orl. *20*); N. W. India from Upper Assam, Cachar and the Khasia Hills (Jerdon *6*, *15*) east to China (Swinh. *c 2*) and Formosa (Swinh. *c 3*), south to Burmah (Oates *15*); Tenasserim (Davison *12*); Malay Peninsula (Blyth etc. *9*); Sangi Islands — Siao (Meyer in Dresd. Mus.); New Guinea (Salvad. *13*); as far as Victoria and South Australia (Ramsay *16*).

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having been previously used by Linnaeus for a plant-genus (Syst. Nat. 1766, II, 580). Zoologists are divided in opinion as to the admissibility of such names into zoology, and, until a general agreement as to nomenclature has been arrived at, we prefer not to allow *Micropus* to replace the familiar name *Cypselus*.

There is in the Dresden Museum a single specimen, killed by Meyer's hunters in Siao, which we somewhat doubtfully identify as a young one of this species. The only other known species it could belong to is *C. leuconyx* Blyth, "as yet only known from the Himalayas and rocky hills of Central India, but", says Mr. Hartert, "further investigation will probably add more to the knowledge of its distribution". Of this form Hume *(10)* remarks it is altogether a much smaller bird: wing 150 to 158 as a maximum; the under surface with much narrower and less marked white fringes than in *pacificus*; the whole of the feet (not the claws, as has been erroneously stated) very pale-coloured, almost albescent in some specimens. In *C. pacificus* Hume finds the wing varies from 178 to 190. The specimen from Siao — wing 167 mm — is thus intermediate between *C. leuconyx* and *C. pacificus* in size, but, since *leuconyx* is said not to exceed 158 mm in the wing, the smallness of the Siao specimen seems only to be explained on the ground that it is a young specimen of the larger species. The white fringes on the under surface are hardly noticeable, but the ends of most of the feathers are worn off.

Swinhoe found this species to be only a summer visitor to China, arriving in the spring and going south in the winter. Taczanowski records its migrations in S. E. Siberia. Its range extends to South Australia, where, as Mr. Hartert remarks, it is probably a winter visitor. Gould also 50 years ago believed that such would prove to be the case.

Australian ornithologists, so far as we have been able to ascertain, have not made any further observations on this interesting subject, except that Cox and Hamilton record it as seen among flocks of *Chaetura caudacuta*, a Swift with a similar range, observed in New South Wales from December to April and in July and August (P.L.S., N.S.W. 1889, 2nd ser., IV, 399).

GENUS CHAETURA Steph.

The Pin-tailed Swifts are easily distinguished by the shafts of the rectrices which project beyond the webs as sharp, strong spines. The toes have the normal number of phalanges, the tarsus is naked.

About 30 species, of almost cosmopolitan distribution.

† * 104. CHAETURA CELEBENSIS (Scl.).

Steel-blue Pin-tailed Swift.

Plate XII.

a. **Chætura gigantea** var. **celebensis** *(1)* Sclat., P. Z. S. 1865, 608; J. f. O. 1867, 130.
b. **Hirundinapus giganteus** *(1)* Wald. (nec Temm.), Tr. Z. S. 1872, VIII, 46.
c. **Chætura gigantea** *(1)* Rosenb., Malay. Archip. 1878, 271.
d. **Hirundinapus celebensis** *(1)* Salvad., Ann. Mus. Civ. Gen. 1878, XII, 320; *(2)* W. Blas. J. f. O. 1883, 114.

Chætura celebensis *(1)* Hartert, Cat. B. XVI, 1892, 476; *(2)* W. E. Clarke, Ibis 1894, 533; *(3)* id., Ibis 1895, 474; *(4)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 1, p. 5.

Adult. Deep steel-black, back and rump with purple gloss; two white spots on the sides of the forehead; sides of the abdomen and under tail-coverts white. In size similar to *C. gigantea*; — total length nearly 229 mm, wing 203, tail 71, tarsus 16.5 (Hartert *1*).

Female. A specimen in the Sarasin Collection marked "♀ juv." (but we cannot see any signs of immaturity) answers to Mr. Hartert's description of the species, except that the lores are reddish brown, not white: wing 208 mm; tail 63; tarsus 16; bill from nostril c. 6 (♀, Tomohon, 29. III. 95: P. & F. S.).

Distribution. N. Celebes — Manado (Leyden Museum, *a 1, d 1*), Tomohon (P. & F. Sarasin); Philippines — Negros (Keay *2*).

Only two specimens of this species were known for a space of thirty years. The name of the collector has not been recorded, but they are stated by Sclater and Hartert to have come from Manado. The latter remarks that they belong to a very distinct species. Next it was recorded from Negros by Mr. W. Eagle Clarke, and in March 1895 a third Celebesian specimen was obtained by the Sarasins. The nearest ally of *C. celebensis* is *Chaetura indica* Hume of India and Ceylon, occurring also in the Andamans in summer as well as in winter (Hume, Str. F. II, 156). This has the white spots on the lores, but differs from *C. celebensis* in the smoky brown — not steel-blue — colour of its under surface. *C. gigantea*, which ranges from the Malay Peninsula to Java, Borneo and Palawan (Hartert), is similar to *indica*, but wants the white spots on the lores. It is strange that birds of such grand flying-powers as these Swifts should seem to have such restricted ranges, but the difficulty of shooting them is no doubt very great.

Chaetura caudacuta (Lath.), however, ranges from Kamtschatka to Tasmania, and has occurred as a straggler in Great Britain. This species also must needs pass over Celebes on its way south to Australia, which it visits during the winter of the North. It has also been observed in Australia in the southern winter months, July and August (Cox & Hamilton, P.L.S., N.S.W. 1889, 399).

Chaetura is interesting for its curious spined tail. Hartert remarks that in *C. gigantea* and in *C. indica* (and, of course, in its ally *C. celebensis*) "the rectrices are very acute and run into a very long spine, whereas in *C. caudacuta*[1]) and *C. nudipes* they are rounded and the spine is only half as long".

C. caudacuta may be at once distinguished from *C. celebensis* by its white throat. Another species with a white throat is *C. picina* Tweedd., for a long time known only by one specimen from Mindanao.

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1) The secondaries in Gould's plate of this species in the "B. Austr." are drawn wrong — much too long.

GENUS COLLOCALIA G. R. Gray.

The Edible-nest Swifts are birds of small to almost the smallest size (not regarding the long wing), furnished with a square tail of ten normally shaped feathers, bare tarsus and toes with the ordinary number of phalanges. They are cave-dwellers. Some of the species form their nests entirely of their own glutinous saliva, others make use of various materials, but probably use saliva for securing them and attaching the nest. Two white eggs. The number of species is uncertain; in 1897 Hartert recognised 14 and some subspecies. They range from India to Australia and occur on some of the islands of the Indian and Pacific Oceans.

+ 105. COLLOCALIA FUCIPHAGA (Thunb.).

Indian Edible-nest Swiftlet.

Mr. Hartert (1892) separates as a subspecies *C. fuciphaga brevirostris* (McClell.) of the Himalayas. The present article relates only to the more typical forms.

1812

a. **Hirundo fuciphaga** *(I)* Thunb., Act. Holm. 1772, XXXIII, 151, pl. IV.

b. **Hirundo vanicorensis** *(I)* Quoy et Gaim., Voy. Astrol., Zool. 1830, I, 206, pl. XII, f. 3.

c. **Collocalia unicolor** (Jerd.), *(1)* Hume, Str. F. 1876, IV, 374; *(2)* Oates, ed. Hume's Nests & Eggs Ind. B. 1890, III, 28.

d. **Collocalia nidifica** *(1)* Gray, Gen. B. I, 1845, 55; *(2)* Bernst., J. f. O. 1859, 112—118; *(3)* Rosenb., Malay. Archip. 1878, 271; *(4)* Salvad., Atti Ac. Sc. Tor. 1880, XV, 344.

Collocalia fuciphaga *(1)* Bp., C. R. 1855, XLI, 977; *(2)* Wald., Tr. Z. S. 1872, VIII, 46; *(3)* Salvad., Cat. Ucc. Borneo 1874, 120; *(4)* id., Orn. Pap. 1880, I, 544; *(V)* Meyer, Vogelskel. pt. V, 1883, 36, pl. 46, fig. 2; *(6)* Pryer, P. Z. S. 1884, 532—538; *(7)* Finsch & Meyer, Ztschr. ges. Orn. 1886, 14; *(8)* Pryer, Auk 1888, 335; *(9)* Lucas, Auk 1889, 9, 11; *(10)* Salvad., Orn. Pap. Agg. 1889, I, 63, III, 224; *(11)* Everett, J. Str. Br. R. A. S. 1889, 152; *(12)* Wiglesw., Av. Polyn. 1891, 17; *(13)* Vorderman, Nat. T. N. Ind. 1891, L, 450; *(14)* id., Notes Leyd. Mus. 1891, 125; *(15)* Hart., Cat. B. XVI, 1892, 498; *(16)* Brns. & Worc., B. Menage Exp. 1894, 35; *(17)* Hart., N. Z. 1895, 472; *(18)* Grant, Ibis 1895, 461; *(19)* Blanf., F. Br. Ind. B. III, 1895, 176; *(20)* Hart., Ibis 1896, 369; *(21)* id., Tierr. 1897, I, 67 pt.

e. **Collocalia vanicorensis** *(1)* Gray, B. Trop. Is. 1859, 4; *(2)* Wiglesw., Av. Polyn. 1891, 18.

f. **Collocalia fusca** err. *(1)* Hickson, Nat. in N. Celebes 1889, 49, 91.

For further synonymy and references see Salvadori *4*, *10*; Hartert *15*; Wiglesw. *e 2*.

Figures and descriptions. Quoy & Gaim. *b I*; Meyer *V* (skeleton); Salvadori *4*; Hartert *15*; Blanford *19*.

Adult. Upper surface dark sooty brown with very little gloss; head, wings and tail darker and more glossy; feathers in front of the eye whitish with dark brown tips; lower surface brownish grey with darker shaft-stripes; under wing-coverts blackish brown. Total length about 114 mm; bill at base 3.8; wing 112—119; tail 56 (Hartert *15*).

Young. Similar to the adult (Hartert).

Skeleton.

Length of cranium	23.0 mm	Length of tibia	19.0 mm
Greatest breadth of cranium .	12.5 »	Length of tarso-metatarsus . .	9.5 »
Length of humerus	8.4 »	Length of sternum.	16.0 »
Length of ulna	12.0 »	Greatest breadth of sternum .	11.0 »
Length of radius	11.0 »	Height of crista sterni . . .	9.0 »
Length of manus	27.2 »	Length of pelvis	16.5 »
Length of femur	12.5 »	Greatest breadth of pelvis . .	14.5 »

Eggs. Nilghiris, S. India — usually 2 in number, dull, almost wholly glossless white, as a rule slender elongated ovals, almost cylindrical, sometimes absolutely cylindrical; at times slightly pyriform: 20—22.8 × 13.5 — 14.7 mm, average size 21 × 13.7 (Hume *c 2*); 20—22 × 13.5 mm (Nehrkorn MS.). The eggs are similarly described by other writers.

Nest. Composed of the saliva of the bird — in India mixed with moss and feathers (Hume *c 2*), in Borneo mixed, apparently, with the substance of a gum-like Alga (Pryer *6, 8*). Breeds in caves, usually in vast colonies.

Distribution. From India south-east to New Caledonia and the New Hebrides, and from Ceylon and the Andamans east to the Marianne and Caroline Islands (see Salvad. *4, 10*; Wg. *12, e 2*). Recorded from Celebes: Macassar (Wallace) by Walden *(2)* and Hartert *(15)*.

The members of the genus *Collocalia* are, like all Swifts, birds of great flying-powers, and, as is usually the case with such they do not conform to the geographical bounds which may be drawn for ill-flying species or for species sedentary for other reasons. Nevertheless it is found that several species have very restricted ranges, while others, *C. francica* and *C. esculenta*, are, like the present species, widely distributed. The *Collocaliae* are, apparently, restricted to districts where there are rocks and caves suitable for them to roost and breed in; these they haunt in common with bats. From the thick deposits of guano on the floors of some of these caves it is evident that they have been in use for a long period; in a cave in Ceylon the guano-deposit was, as Colonel Legge was informed, 30 feet thick, and Pryer mentions *(6)* that a pole thrust down 18 feet into the deposit on the floor of the great cave "Simud Putech" of North Borneo did not reach the bottom. This cave is described by Daly (P. Z. S. 1888, 110), as being from 850 to 900 feet in depth, coated with a layer of guano of from 5 to 15 feet deep. The birds are remarkable for their adhesiveness to any selected roosting or nesting spot; in certain parts the species are migratory visiting their breeding-caves and leaving them regularly; and Davison describes a case (Str. F. II, 159) where "a large number of these birds had taken up their sleeping quarters against the roof of a shed on Viper Island, Port Blair, occupying about a square yard of the surface; this place they continued to occupy till the shed was destroyed, when, of course, they disappeared; but after a time another shed was built exactly on the same site, and as soon as the roofing was completed back came all the Collocalias and re-occupied the same spot on the roof of the new shed as they had occupied in the old". The same excellent observer describes the attempts of a pair,

continued for nearly a week, to fix scraps of moss, the commencement of their nest, on the painted ceiling of a room, "but failed to get a single piece to stick, and so at last gave it up as a bad job".

The nests are chiefly formed of the saliva of the birds more or less intermixed with feathers and sometimes with moss. The high value (as an aphrodisiacum) set upon them by the Chinese for soup is well known, and it is said that nests of the purest quality — the white ones — are worth their weight in silver[1]). According to Mr. Daly, the white nests of *C. fuciphaga* are those which are gathered before the bird has commenced to lay any eggs, and which are composed of clear transparent mucilaginous matter, with very few feathers mixed up with them. The next quality is the red or grey nest, partly mixed with feathers and in which eggs are sometimes found; the least valuable are the black nests, which are much mixed with feathers and sometimes contain fledglings. The black nests have been supposed to belong to different species or varieties, but Mr. Daly says these nests are those which have been "overlooked at the previous gathering and have darkened or deteriorated from exposure to water and to the atmosphere of the caves. The partial decomposition of the mucous matter renders them the least valuable".

Bernstein *(d 2)* has called attention to the enormous development of the salivary glands in these birds, especially the glandulae sublinguales. Their great size is attained only during the time that the birds are building their nests, "after this, even during the laying of the eggs, they atrophy and appear but little bigger than those of other birds. At that time (the building time) they appear, when the bill of the bird is opened, like two large pads at the side of the tongue. They secrete in quantities a thick, adhesive slime . . , resembling gum-arabic . . . which can be drawn out of the mouth in somewhat long threads. If the end of such a thread of slime is placed on the point of a bit of stick and the latter is then turned slowly on its axis, in this manner the whole mass of saliva for the moment present can be drawn out of the mouth and even out of the orifices of the glands". As Bernstein found from some tame specimens the supply of saliva stands in direct relation to the quantity of food supplied: "it was very small, when the birds had gone hungry a few hours". Bernstein came to the conclusion that the glue-like substance of the nest was formed solely by these secretions of the bird, and believed that the feathers seen in the nest are such as have been caught and stuck by this adhesive matter when half dry. Nevertheless, chemical analysis ultimately proved the presence also, in addition to the bird's saliva, of a gumlike substance from an Alga in the nests of *C. fuciphaga* obtained by Pryer in North Borneo *(8)*. That *C. fuciphaga* should employ such foreign substances sometimes or always is not surprising, since some other *Collocaliae* are known to make use of moss, lichens, etc., as does *C. fuciphaga* itself in India *(c 2)*.

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1) In 1896 there were imported into China 3,600 000 edible birds-nests.

† 106. COLLOCALIA ESCULENTA (L.).

White-bellied Swiftlet.

a. **Hirundo esculenta** *(I)* Linn., S. N. 1766, XII, 343.
Collocalia esculenta *(1)* Wald., Tr. Z. S. 1872, VIII, 46; *(2)* Meyer, Ibis 1879, 65; *(3)* Salvad., Orn. Pap. 1880, I, 540; *(4)* Guillem., P. Z. S. 1885, 549; *(5)* Hickson, Nat. in N. Celebes 1889, 49, 91; *(6)* Salvad., Orn. Pap. Agg. 1889, 63; *(7)* Hartert, Cat. B. XVI, 1892, 509; *(8)* Tristr., Ibis 1892, 296; *(9)* Büttik., Notes Leyden Mus. 1892, 194; *(10)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 8; *(11)* iid., ib. 1896, Nr. 2, p. 14; *(12)* Salvad., Ann. Mus. Civ. Gen. 1896, XXXVI, 73; *(13)* Hartert, Nov. Zool. 1896, 158, 175, 243, 570; *(14)* id., Tierreich 1897, I, 70.
b. **Collocalia hypoleuca** *(1)* Gray, P. Z. S. 1858, 170, 189; *(II)* id., Cruise "Curaçoa", B. 1873, 356, pl. II, fig. 1; *(3)* Rosenb., Malay. Archip. 1878, 271; *(4)* Salvad., Atti Ac. Sc. Tor. 1880, 346.
c. **Collocalia viridinitens** *(1)* Gray. Ann. and Mag. N. H. 1866, XVII, 120.
d. **Collocalia sp.** *(1)* Büttik., Notes Leyd. Mus. 1891, 210.
"Tetekek", Peling, **"Tepede"**, Banggai (Nat. Coll.).
For further synonymy and references see Salvad. *3*, *6*, Hartert *7*.

Adult. Above glossy dark bluish green, tail and outer webs of quills bluer, inner webs of latter dusky, rectrices, except the two middle ones, with a large patch of white on basal half of the inner webs; bases of loral plumes white; chin and sides of face dark mouse-grey; throat, breast and sides mouse-grey with white margins, these margins increasing in width on the lower parts, so that the abdomen is pure white; under tail-coverts — the longest uniform blue-black, the shorter ones blackish green, broadly bordered with white, the shortest uniform white; under wing-coverts blackish, fringed with white (Minahassa — Nr. 821). Bill and feet dark brown (Platen, Mus. Nehrkorn).

Sexes. Alike.

Young. Not so glossy above, but otherwise similar to the adult (Hartert 7).

Measurements.	Wing	Tail	Bill from gape	Tarsus
a. (Nr. 821) ad. Minahassa (Faber)	94	44	8.5	—
b. (Nr. 820) ad. Minahassa (Faber)	85	35	8	—
c. (Sarasin Coll.) ♂ ad. Tomohon, 12. X. 94	97	40	—	7.5

A series of 17 from Peling and Banggai were very small: wing 69—90 mm, average 80.

Eggs. Amboina. Elliptic and white, like the eggs of all *Cypselidae* and *Trochilidae*. Size 17.5×11 mm. They are similar to a series of Humming-birds eggs, the shells of which, however, are somewhat more delicate (Nehrkorn MS.). Always 2 in a clutch (Hartert).

Nest. A nest in the Sarasin Collection "is built entirely of lichens and was stuck fast on a rock with saliva. In form it resembles perfectly the ordinary edible nests. Of these we saw many, as we were returning along the coast from Malibagu back to Kema. As is known the harvesting of these nests is a monopoly of the king of Bolang Mongondo" (P. & F. Sarasin in lit.). By Mr. Everett "on November 2nd a colony was found breeding in a cave near Indrulaman. The nests were not edible, but consisted of moss, rootlets, and little twigs, agglutinated and fixed to the walls of the cave with saliva" (Hartert *13*).

Breeding season. Dr. Hickson *(5)* found this species and *C. fuciphaga* breeding in countless numbers in two caves at Tanjong Aros, Talissi Island, North Celebes on August 28th. In Amboina Dr. Platen collected quantities of eggs on July 23rd, 1881.

Distribution. Celebes — Talissi Island (Guillem. *4*, Hickson *5*), Strait of Lembeh (Meyer *2*), Minahassa (P. & F. Sarasin), Macassar (Wallace *1*, *7*), Maros (Guillem. *4*), Bonthain (Everett *13*); Peling and Banggai (Nat. Coll.); Moluccas and Papuasia as far as the Solomon Islands (Salvad. *4*, *6*) to Cape York, Australia (Hartert *7*).

This species has a more southern range than *C. fuciphaga*, from which it may be distinguished by its white abdomen and somewhat smaller size.

As is proved by the thickness of the guano deposits (see preceding article) these birds have evidently tenanted certain caves for enormous periods, and it is not surprising that this species seems to vary locally or even "troglodytically"; for instance the specimens from Peling and Banggai examined by us were very small.

+ 107. COLLOCALIA FRANCICA (Gm.).

Little Grey-rumped Swiftlet.

a. **Hirundo francica** *(1)* Gm., S. N. 1788, I, 1017.

Collocalia francica *(1)* Gray, List B. Br. Mus. 1845, II, Fissirostr. 21; *(II)* M.-Ed. & Gr., Ois. Madag. 1879, 198 pl. 72—5; *(3)* Hart., Cat. B. XVI, 1892, 503; *(4)* Blanf., F. Br. Ind. B. III, 1895, 178; *(5)* Hart., N. Z. 1896, 175; *(6)* id., Tierr. 1897, I, 68.

b. **Macropteryx spodiopygia** *(I)* Peale, U. S. Expl. Exped. 1848, 170, pl. 49.

c. **Collocalia spodiopygia** *(I)* Cass., U. S. Expl. Exped. 1858, 184, pl. 12, f. 3; *(2)* Finsch & Hartl., Orn. Centralpol. 1867, 48; *(3)* Salvad., Orn. Pap. 1880, I, 546; *(4)* id., Agg. O. P. 1889, 63; *(5)* Wiglesw., Av. Polyn. 1891, 18.

d. **Collocalia terrae-reginae** *(I)* Gould, B. New Guinea 1875, IV, pl. 38.

e. **Collocalia infuscata** *(1)* Salvad., Atti Ac. Sc. Tor. 1880, XV, 348.

For further references cf. Finsch & Hartlaub *c 2*; Milne-Edwards & Grandidier *II*; Salvadori *c 3*, *c 4*; Wiglesworth *c 5*; Hartert *3*.

Figures and descriptions. Gould *d I*; Peale *b I*; Cassin *c I*; M.-E. & G. *II*; F. & H. *c 2*; Salvadori *c 3*; Hartert *3*; Blanford *4*.

Diagnosis. Distinguishable from *C. fuciphaga* by its having a grey or dusky white band across the rump, from *C. esculenta* by its having no white on the abdomen, and by its larger size.

Measurements. Wing 111—114 mm; tail 53 (Hartert *3*).

Skeleton see Milne-Edwards & Grandidier *II*.

Eggs and nest cf. Finsch & Hartlaub *c 2*; Hume, Nests and Eggs Ind. B. Oates ed. III, 35.

Distribution. Burmah, through the Philippines and the East Indian Islands to North Australia, east as far as Fiji and Samoa, west to Mauritius and Bourbon (cf. Hartert *3*). — In the Celebesian area: Djampea Island (Everett *5*).

Quite recently Mr. Hartert was able to record two fully feathered nestlings and a number of nests and eggs from Djampea between Celebes and Flores, which he ascribes to this species. It has not as yet been recorded from the

mainland of Celebes. The Dresden Museum recently got specimens from Mindanao. The species is a puzzling one, and varies in a way that is likely to cause little satisfaction to trinomialists.

GENUS MACROPTERYX Sw.

The subfamily *Macropteryginae* consists only of the present genus. Its appearance is perfectly Cypseline, but it is easily recognisable by its long forked tail, the outermost rectrices reaching as far as the ends of the wings; the toes are ordinary, the tarsus bare and very short, about as long as the hind toe without the claw. The superciliary plumes are long, forming tufts. There are two fenestrae in the sternum posteriorly. Its nidification is very peculiar, resembling most that of the Goatsucker, *Batrachostomus* (see below). Five species have been recognised by Hartert, ranging from India to the Solomon Islands.

+ * 108. MACROPTERYX WALLACEI (J. Gd.).

Celebesian Crested Swift.

a. **Dendrochelidon wallacei** *(1)* Gld., P. Z. S. 1859, 100; *(II)* id., B. Asia I, pl. 23 (1859); *(3)* Wall., P. Z. S. 1862, 339; *(4)* Sclat., P. Z. S. 1865, 616; J. f. O. 1867, 140; *(5)* Gray, HL. 1869, I, 65; *(6)* Rosenb., Malay. Archip. 1878, 271; *(7)* W. Blas., J. f. O. 1883, 125; *(8)* Heine & Rchnw., Nomencl. Mus. Hein. 1890, 190.

Macropteryx wallacei *(1)* Finsch, Neu Guinea 1866, 162; *(2)* Walden, Tr. Z. S. 1872, VIII, 45; *(3)* Meyer, Ibis 1879, 65, 146; *(4)* W. Blas., J. f. O. 1883, 136; *(5)* Guillem., P. Z. S. 1885, 548; *(6)* W. Blas., Ztschr. ges. Orn. 1885, 246; *(7)* id., ib. 1886, 95; *(8)* Hickson, Nat. in N. Celebes 1889, 91; *(9)* Tristr., Cat. Coll. B. 1889, 112; *(10)* Hartert, Cat. B. XVI, 1892, 515; *(11)* Büttik., Zool. Erg. Weber's Reise Ost.-Ind. 1893, III, 275; *(12)* M. & Wg., Abh. Mus. Dresden 1895, [Nr. 8, p. 8; *(13)* iid., ib. 1896, Nr. 1, pp. 5, 9; *(14)* iid., ib. 1896, Nr. 2, p. 13; *(15)* Hart., Nov. Zool. 1896, 175.

b. **Dendrochelidon klecho** var. **wallacei** *(1)* Brügg., Abh. Ver. Bremen 1876, V, 55.

"Peapatta", Gorontalo, Ros. *a 6.* **"Burong padang"** (Knife-bird), Malay, Manado, Meyer *3.* **"Pavas"**, Manado, Guill. *5.* **"Pavas"**, Talissi, Hicks. *8.* **"Pisok besar"**, Banka, Nat. Coll. **"Rewata"**, Tjamba, S. Cel., Platen *6.* **"Diding"**, Tonkeau, E. Cel., Nat. Coll. **"Papingis"**, Peling; **"Tepede babasar"**, Banggai, Nat. Coll.

Figure and descriptions. Gould *a II*, *a 1*; Guill. *5* (young); W. Blas. *6*; Hart. *10*; Bütt. *11.*

Adult male. Head above, wing-coverts, exposed webs of quills, and tail, shining blackish blue, varied on crown with bronze-green, and passing into bronze-green with blackish blue margins on most of the feathers on hind neck, mantle, and scapulars, which again shades off into the dark grey of the back, rump, and upper tail-coverts; the longest tertiary coverts lighter grey; ear-coverts dull dark chestnut, face black glossed with green; a very narrow superciliary stripe of grey; under parts from chin downwards dark grey, becoming whitish tinged with buff and fulvous on abdomen and shaded with greenish on sides of breast; under wing-coverts dark brown, washed with bluish at metacarpal edge (Minahassa [♂] — C 3499). Iris brown; feet grey; claws blackish; bill black (Meyer *3*).

Adult female. Like male but the ear-coverts greenish steel-blue, not chestnut (Hartert *10*).

Young. The under surface marked irregularly with buff feathers, which are white at the base and tipped with brownish black; the tertials are white, and the primaries and secondaries strongly tipped with that colour (Guillem. *5*).

Changing plumage. Young birds assuming the adult dress have a curious appearance. The feathers of immaturity are pale brown, tipped with white, with subterminal black bars, those of the upper parts are dull blackish brown with buff-brown edges; these are mixed with the grey or glossy blackish feathers of maturity (♂ juv. Palopo, 22. I. 95: Sar.).

Variation. A series of specimens from E. Celebes, Peling and Banggai prove to be more bronzy on the head and wing-coverts than others from North Celebes, which show stronger tints of steel-blue; still two examples from the latter locality do not differ from the specimens in question.

Measurements. Wing 171 (juv.)—190 (adult); tail 92 (juv.)—124 (adult); rictus 19.5—20.9; tarsus 8.0 circa (W. Blasius *6*, and specimens Dr. Mus.).

Eggs and nest. Unknown.

Distribution. Celebes Province — Southern Peninsula: Macassar (Wallace *a 1*, *10*), Tjamba (Platen *6*), Luwu and Boni (Weber *11*), Palopo (P. & F. Sarasin); Northern Peninsula: Minahassa (Wallace *10*, Meyer *3*, etc.), Talissi Id. (Hickson *8*), Banka Id. (Nat. Coll. in Dresd. Mus.), Togian Islands (Meyer *3*); E. Peninsula, Tonkean (Nat. Coll.); Peling and Banggai (iid.); Sula Islands (Allen *a 3*, *10*).

This species is most nearly related to *M. longipennis* (Rafin.) = *klecho* Horsf., which ranges from Tenasserim to Java and Borneo. *M. wallacei* differs by its larger size (wing about 178 as against 165 mm), the bluer — less green — tint of the upper parts, the lighter grey of the under surface, and in the male adult the darker chestnut of the earcoverts (Büttik. *11*, Hartert *10*).

The genus *Macropteryx* is separated as a family, *Dendrochelonidae*, by Lucas (Auk 1889, 8), and as a subfamily of the *Cypselidae* by Hartert, who regards it as an approach to the *Caprimulgidae*. Among the Swifts it seems to be related to the *Chaeturinae*, also marked off as a subfamily in the Catalogue of Birds. In the typical Swifts, *Cypselinae*, the front toes contain each only three plalanges: in *Chaetura* and *Macropteryx* the normal numbers — five in the outer toe, four in the middle toe — are seen. In their peculiar nesting-habits, the *Macropteryginae* offer, as Hartert remarks, a striking correspondence with the curious nidification of the Goatsucker, *Batrachostomus*. Bernstein seems to have been the first to discover the nidification of *Macropteryx*, and his admirable observations (J. f. O. 1859, 184) on *M. klecho* in Java remain unsurpassed in fullness and interest. "It chooses", he says, "a free-standing branch, high in the crown of a tree, to build its nest on. If the choice of such a spot is remarkable for a member of the family of the *Cypselidae*, the relations in size between the bird, nest, and egg are far more remarkable. The nests, by its more or less semicircular form and the manner in which the component materials are bound together, calls to mind to some extent the nests of the *Collocaliae*; it is however much smaller and flatter than these. The nests measured by me were in depth about 10 mm by 30—40 mm broad against 50 mm in those of the much smaller *C. nidifica* (*esculenta* Horsf.). The nest is always found on a horizontal branch, usually not more than an inch thick, which at the same time forms the hinder

wall of the nest; here it is fixed so as to form at the side thereof a somewhat flat, longish, semicircular saucer, just large enough to contain the single egg. The walls of the nest are extremely thin, and delicate, scarcely thicker than parchment. They consist of feathers, some few bits of tree-lichens and small pieces of bark, which materials are glued together with a sticky vehicle, without doubt, as in the *Collocaliae*, the saliva of the bird; occasionally in these birds also the salivary glands swell remarkably at the time of reproduction. The smallness and fragility of the nest does not allow of the brooding bird sitting thereon. On the contrary, as I have repeatedly observed, it sits on the bough and covers the nest and the egg in it with the belly alone. The latter, with a length of 25 mm and a maximum breadth of 19 mm, answers perfectly to the size of the bird. It it of regular, perfectly oval form, so that it is not possible to make out with certainty a sharp or a blunt end. Its colour is a very pale sea-blue, which colour gets paler after blowing the egg, and then white, with faint tinges of blue. According to my observations the bird rears two broods a year, one immediately after the other, but rarely makes use of one and the same nest for this purpose. With such a low rate of reproduction, it can cause no surprise that this bird, though probably occurring all over Java, is nowhere very plentiful". The nest of *Macropteryx coronatus* (Tick.) is very similarly described by Hume (Oates ed. Hume's Nest and Eggs Ind. B. III, 36). The nest of *Batrachostomus hodgsoni* (Gray) is described in the same work (p. 40) as a circular pad barely $3^1/_2$ inches in diameter, about $^3/_4$ inch thick. This is placed on the upper surface of a horizontal bough, and receives one white egg. In this case, apparently, there would be nothing to prevent monkeys and other marauders from helping themselves to the white egg, but that *Batrachostomus* is a nocturnal bird and doubtless is sitting upon the nest all through the day.

The genus *Macropteryx*, is most strongly represented in the Oriental Region, but ranges from India to the Solomon Islands.

Macropteryx mystacea (Less.). Gray (HL. 1869, I, 65) mentions Celebes as a locality for this species, which ranges from Halmahera to the Solomons, and Rosenberg (Mal. Arch. 271) repeats this indication, doubtless derived from Gray (see W. Blasius, J. f. O. 1883, 125). There appears to be no proof of this species having ever been found in the Province.

Macropteryx comata (Temm.). As Salvadori points out (Cat. Ucc. Borneo, 1874, 124), Cassin indicates (Cat. Hirund. Mus. Philad. 1853, 15) individuals of this species from Celebes and Timor. The localities are repeated by Gray (l. c.), by von Rosenberg (l. c.) "Celebes", and by Hartert (Cat. B. XVI, 518); but in the case at least of Celebes no evidence of their correctness has been produced.

ORDER PASSERES.

To this order belong pre-eminently the Song-birds, the males of the majority of which have the habit in the breeding season — in many cases at other times of the year also — of uttering a sequence of notes almost always pleasing to the human ear (and doubtless still more so to the singer and his partner), though a few, such as the Crows, have no song properly so called, while some birds belonging to other orders, such as, for instance, the common Fowl and the Redshank, have a very appreciable form of song. The *Passeres* number some 6000 species, ranging in size from the most minute to the Raven and Lyre-bird. The great majority of them feed upon insects and other invertebrate organisms, seeds and fruits, some few occasionally on carrion, and occasionally *(Laniidae, Corvidae)* on small birds and other small vertebrates. As architects they are the most skilful nest-builders in the bird-world, and those which breed in holes as a rule (if not always) form a comfortable lining thereto, wherein they differ from certain "Picariae", such as *Merops*, which do not line their nesting-holes. The young are hatched blind and naked.

There is no difficulty in distinguishing the *Passeres* from other groups of birds, except from certain Picarian forms, such as the Swifts, which approach the Swallows in external appearance and habits, and the Rollers, which are of a corvine appearance, or the Broad-billed Rollers, which resemble the *Eurylaemidae*. For the distinction of the *Passeres*, avian anatomists attach most importance to the toes and their flexor tendons, to the palatal bones, and to the syrinx.

The toes are normal, that is, there are three in front and the hallux behind, and the hallux is served by a free flexor tendon, not united to the flexor tendon of the three anterior toes, except in the *Eurylaemidae*, which are now commonly allowed to rank as a distinct suborder, or order.

The palate is aegithognathous (as it is indeed also in certain Picarian forms). "In the true aegithognathous structure the vomer is broad, abruptly truncated in front and deeply cleft behind, so as to embrace the rostrum of the sphenoid; the palatals have produced postero-external angles, the maxillo-palatals are slender at their origin, and extend obliquely inwards and backwards over the palatals, ending beneath the vomer in expanded extremities, not united either with one another or with the vomer" (Newton, D. B. p. 2).

The syrinx has received great attention especially from Garrod and Gadow. The former used it as the diagnostic for forming two main groups of the *Passeres*, viz.

Acromyodi: "in which the intrinsic muscles of the syrinx are fixed to the ends of the bronchial semi-rings";

Mesomyodi: "in which the intrinsic muscles of the syrinx are fixed to the middle of the bronchial semi-rings" (Oates, Faun. Br. Ind. B. I. p. 5).

Gadow makes a somewhat different division:

Anisomyodae: in which the muscles of the syrinx are not bilaterally symmetrical, but either entirely lateral, or purely dorsal, or ventral;

Diacromyodae: in which the muscles of the syrinx are bilaterally symmetrical, being inserted in the dorsal and ventral ends of the bronchial rings (Bronn's Kl. & Ord. 1893, VI, pt. 4, II, p. 272).

FAMILY PITTIDAE.

The Pittas are *Passeres* of terrestrial habits and may be easily recognised by their long tarsi, short tails (about as long as the tarsus or a little longer), and brilliant coloration; glossy green, deep velvety-black, turquoise and other blues, and pure red being common tints.

The formation of the syrinx led Garrod to refer the Pittas to his *Mesomyodian Passeres*. As Prof. Newton remarks, "this in itself was an unexpected determination, for all the other birds of the group, as then known, inhabit the New World, where no Pittas occur". Dr. Gadow makes the Pittas a family of the *Clamatores*-section of his *Anisomyodian Passeres*, the other families of this group being American and one small one of three species, the *Xenicidae*, New Zealandian. In the opinion of Gadow the *Pittidae* form a transition from the *Clamatores* to the *Subclamatores* (consisting of the single family *Eurylaemidae*).

The bill is about as long as the cranium, without rictal bristles, the nostril oval; there are 10 primaries, the 1st large, about as long as the secondaries; 12 rectrices. The sexes are similar in coloration.

GENUS PITTA Vieill.

The family *Pittidae* consists of about 50 species, which fall into a number of sections, but it is doubtful if more than two of them should be separated generically, viz. *Anthocincla* which has long "ear-tufts" and a longer more compressed bill, found in a Burmese species, and *Melampitta* of New Guinea, which is entirely black and has the frontal plumes short, erect, and the tail longer (cf. Sclater, Cat. B. XIV, 1888, 412; Oates, Faun. Br. Ind. B. II, 1890, 387).

+ * 109. PITTA CELEBENSIS Müll. Schl.

Celebes Red Pitta.

Pitta celebensis *(1)* M. & S., Verh. Natuurk. Comm. 1839—44, Aves, Pitta, p. 18 (ex Forsten in litt.); *(2)* Gray, Gen. B. I, 213 (1846); *(III)* Westerm., Bijdr. t. d. Dierk. 1854,

I, 46, Pitta, pl. 3; *(4)* Schl., Handl. Dierk. 1857, 254; *(5)* Wall., Ibis 1860, 142; *(VI)* Schl., Vog. Ned. Ind. Pitta 1863, 17, 34, pl. 4, fig. 4; *(7)* id., Mus. P.-B. Pitta 1863, 6; *(8)* Wall., Ibis 1864, 105; *(9)* Finsch, Neu Guinea 1865, 167; *(10)* Gray, HL. 1869, I, 296, Nr. 4377; *(10bis)* Wall., Malay Archip. 1869, I, 366; *(11)* Schl., Revue Pitta 1874, 10, pt.; *(12)* Salvad., Ann. Mus. Civ. 1875, VII, 663; *(13)* Brüggem., Abh. Ver. Bremen 1876, V, 64; *(14)* Meyer, Rowley's Orn. Misc. 1877, II, 327; *(15)* Sclat., P. Z. S. 1877, 99; *(XVI)* Gld., B. New Guinea IV, pl. 34 (1878); *(17)* Rosenb., Malay. Archip. 1878, 272; *(18)* Guillem., P. Z. S. 1885, 552; *(19)* W. Blas., Ornis 1888, 102; *(20)* Sclat., Cat. B. XIV, 1888, 436; *(21)* Tristr., Cat. Coll. B. 1889, 119; *(22)* Hartert, Kat. Mus. Senckenb. 1891, 107; *(23)* Whitehead, Ibis 1893, 505; *(XXIV)* Elliot, Monogr. Pitt. pt. III, 1894; *(25)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 13; *(26)* iid., ib. 1896, Nr. 2, p. 18; *(27)* Hartert, Nov. Zool. 1897, 163.

a. **Brachyurus celebensis** *(1)* Bp., Consp. 1850, I, 255; *(II)* Elliot, Mon. Pitt. 1863, pl. XVII; *(3)* id., Ibis 1870, 418.

b. **Erythropitta celebensis** *(1)* Bp., Consp. Vol. Anisod. 1854, 7; *(2)* Wald., Tr. Z. S. 1872, VIII, 62; *(3)* Meyer, Ibis 1879, 126; *(4)* Platen, Gefied. Welt 1887, 218; *(V)* Meyer, Vogelskel. I, 1892, 33, t. CLXI.

"Mopo" (= Grandfather), Minahassa, Meyer *b 3.*

"Mupu sava merah", Minahassa, Guillem. *18.*

"Tenge-tenge", [? Gorontalo], Rosenb. *17.*

"Tagongong", Tonkean, E. Celebes, Nat. Coll.

Figures and descriptions. Gould *XVI* [immature[1])]; Westermann *III*; Schlegel *VI*; Elliot *a II, XXIV, a 3*; Meyer *b V* (skeleton); Müller & Schlegel *1*; Sclater *20.*

Adult. Head above chestnut with a vertical stripe from forehead to occiput glaucous blue; mantle, back, scapulars and lesser wing-coverts dull French-green, changing with the light; remaining upper-parts dull blue, two or three wing-coverts near the carpal edge partly white forming a concealed spot; bastard-wing and primaries black, the latter greyish at their distal ends, a white speculum formed by the second, third and fourth quills; lores, ear-coverts, chin and upper throat rufous isabella-colour, touched with blue on the ear-coverts and above the eye; jugular collar black, passing narrowly round hind neck; a broad pectoral collar below the last cerulean-blue, passing narrowly round hind neck, on sides of chest and body greenish, broadly bordered on the breast with a black band; remaining under-parts deep scarlet; under wing-coverts drab, the axillaries tipped with white (ad. near Manado, Aug.—Sept. 1892: Nat. Coll. — C 10886, ♂ ad. Rurukan. 21. VII. 84, Platen in Mus. Nehrk., Nr. 947).

Iris greyish brown (M. *b 3*) or pale olive (Wall. *8*) or ruddy brown (Guill. *18*); bill black, feet greyish black, dusky lead-colour, pinkish slate or grey (*b 2, 8, 18*, Platen).

Young in changing plumage. The vertical stripe buff, a patch on the jugulum buff-white bordered below with black; remaining under-parts isabella-colour, washed with darker brown on the breast, sides and ear-coverts, paler and washed with scarlet on the abdomen; a few blue feathers of the pectoral collar present and others of deep scarlet on the abdomen; upper surface much as in the adult; bill short, most of under bill and terminal part of upper yellowish white (Mantehage Id., 22. IV. 93: Nat. Coll. — C 12199).

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[1]) The white spot on the jugulum is a sign of immaturity, though it may also be common in adult females.

Measurements. Adults — wing 103—109 mm; tail 41; tarsus 38 c.; bill from nostr. 14.5—16; immature — wing 101; tarsus 36; bill fr. nostr. 12.5.

Skeleton.

Length of cranium fr. sin. nasofr.	25.9 mm	Length of fibula	23.3 mm
Greatest breadth of cranium	18.5 »	Length of tarso-metatarsus	38.0 »
Length of humerus	30.2 »	Length of sternum	33.5 »
Length of ulna	35.6 »	Greatest breadth of sternum	20.0 »
Length of radius	32.8 »	Height of crista sterni	11.0 »
Length of manus	31.0 »	Length of pelvis	33.0 »
Length of femur	28.5 »	Greatest breadth of pelvis	20.5 »
Length of tibia	49.0 »		

Distribution. Celebes — Minahassa (Forsten *1*, Wallace *5*, *20*, etc.); Bolang-Mongondo (P. & F. Sarasin); Gorontalo (Rosenb. *11*); Mantehage Id. (Nat. Coll.); Togian Islands (Meyer *b 3*); Tonkean, E. Celebes (Nat. Coll.); Tawaya, W. Celebes (Doherty *27*); Maros, S. Celebes (Wallace *10bis*); Segeri, S. Celebes (Meyer *b 3*).

The Red Pitta of Celebes seems to be a somewhat rare bird in the south of the island. Writing on its habits Meyer has remarked *(b 3)*: "Although not so difficult to procure as the Black-headed, it is nevertheless a bird which it is not easy to get a shot at, being very quiet in the day-time and seldom calling except in the morning and evening its 'tüüüü tschui'. In the evening the cry 'oppo' (origin of the native name) is heard, with which the male and female call one another, the notes sounding melancholy and protracted. 'Oppo' means, in the language of the country, 'grandfather'; and the natives tell the tale, that once a child, which had gone with its grandfather into the forest, got astray and was transformed into a bird, which now always calls for its grandfather".

"*Pitta celebensis* only runs on the ground, and is very shy and watchful; it glides noiselessly through the leaves; and as its back is green it can only with difficulty be detected. To approach it one must creep through the densest brushes; and without imitating the call of the bird its pursuit would be in vain. But if the hunter imitates the cry he can draw the bird almost to the muzzle of his gun. During the day-time they go singly, in the evening in pairs together. The nest is to be found in brushes near small pools.

The bird digs a hole in the slope of the river-bank, and builds its nest therein of wood and leaves, lined with cotton or hairy plant-materials (for instance, from *Arenga saccharifera* Lab.). It lays two eggs. . . . This *Pitta* feeds on beetles, small caterpillars, etc."

Dr. Platen and v. Rosenberg likewise mention the quiet, concealed habits of this bird. The latter describes its nest, or that of *P. forsteni*, as being always placed upon the ground and formed of leaves and moss, lined with fine grass-stalks.

Pitta celebensis is one of a group in which Mr. Whitehead has recently *(23)* enumerated 12 species, and *P. inspeculata* M. & Mg. should now be added: "a very compact group, all the species having brown or black-and-brown

throats, beneath which is a pectoral band of shining greyish blue, sometimes flanked with green, and divided by a black band or otherwise from the bright scarlet breast".

The group is distributed as follows:

Habitat	*P. kochi*	*P. erythrogaster*	*P. propinqua*	*P. inspeculata*	*P. caerulcitorgues*	*P. palliceps*	*P. celebensis*	*P. rubrinucha*	*P. rufiventris*	*P. cyanonota*	*P. mackloti*	*P. finschi*	*P. loriae*	Authorities
Luzon	*	*	.	.	.	.	.	.	.	.	.	.	.	Sclater, R. G. W. Ramsay
Tawi Tawi	.	*	.	.	.	.	.	.	.	.	.	.	.	Bourns & Worcester
Tablas, Sibuyan	.	*	.	.	.	.	.	.	.	.	.	.	.	Bourns & Worcester
Calamianes	.	*	.	.	.	.	.	.	.	.	.	.	.	Bourns & Worcester
Panay, Guimaras	.	*	.	.	.	.	.	.	.	.	.	.	.	Bourns & Worcester
Masbate	.	*	.	.	.	.	.	.	.	.	.	.	.	Bourns & Worcester
Siquijor	.	*	.	.	.	.	.	.	.	.	.	.	.	Bourns & Worcester
Mindoro	.	*	.	.	.	.	.	.	.	.	.	.	.	Steere
Palawan	.	*	*	.	.	.	.	.	.	.	.	.	.	Sharpe, W. Blas., Everett
Balabac	.	*	.	.	.	.	.	.	.	.	.	.	.	Everett
Zamboanga	.	*	.	.	.	.	.	.	.	.	.	.	.	Sclater
Guimaras	.	*	.	.	.	.	.	.	.	.	.	.	.	Steere
Marinduque	.	*	.	.	.	.	.	.	.	.	.	.	.	Steere
Samar	.	.	*	.	.	.	.	.	.	.	.	.	.	Steere
Basilan	.	*	.	.	.	.	.	.	.	.	.	.	.	Sclater, R. G. W. Ramsay
Mindanao	.	*	*	.	.	.	.	.	.	.	.	.	.	Sharpe, Steere, M. & Wg.
Sooloo	.	*	.	.	.	.	.	.	.	.	.	.	.	Sharpe, W. Blasius
Talaut	.	.	.	*	.	.	.	.	.	.	.	.	.	M. & Wg.
Great Sangi	.	.	.	.	*	.	.	.	.	.	.	.	.	Sclater, M. & Wg.
Siao	.	.	.	.	.	*	.	.	.	.	.	.	.	Brügg., Schleg., M. & Wg.
Celebes	.	.	.	.	.	.	*	.	.	.	.	.	.	M. & Wg., Schlegel
Buru	.	.	.	.	.	.	.	*	.	.	.	.	.	Salvadori, Sclater
Batchian	.	.	.	.	.	.	.	.	*	.	.	.	.	Salvadori, Sclater
Ternate	.	.	.	.	.	.	.	.	.	*	.	.	.	Salvadori, Sclater
Halmahera	.	.	.	.	.	.	.	.	*	.	.	.	.	Salvadori, Sclater
Guebeh	.	.	.	.	.	.	.	.	.	*	.	.	.	Salvadori, Sclater
Dammar	.	.	.	.	.	.	.	.	*	.	.	.	.	Salvadori, Sclater
Obi	.	.	.	.	.	.	.	.	*	.	.	.	.	Salvadori, Sclater
Papuan Islands	.	.	.	.	.	.	.	.	.	.	*	.	.	Salvadori, Sclater
S. E. New Guinea	.	.	.	.	.	.	.	.	.	.	.	*	.	E. P. Ramsay, Salvadori
Su-a-u Island [1]	.	.	.	.	.	.	.	.	.	.	.	.	*	Salvadori
Cape York	.	.	.	.	.	.	.	.	.	.	*	.	.	Salvadori

It will be observed that the distribution of the Philippine species appears to be somewhat mixed up as regards Luzon, Mindanao and Palawan, and a re-examination of specimens with special regard to age and sex might prove instructive. *P. erythrogaster* is very possibly the female or young male of *propinqua*.

1) An island near South Cape, New Guinea.

P. celebensis is most like its nearest neighbour *P. palliceps* Brügg. of Siao, which has a much paler chestnut head, the black band below the blue pectoral collar absent, or nearly so, and the bill longer; *P. rubrinucha* Wall. of Buru has no black band below the blue, and also a scarlet patch on the nape. These three species agree in having a broad pale blue vertical stripe, but this often appears in specimens of *P. mackloti* and we find signs of it in most individuals of *P. inspeculata* and in *P. cyanonota*. Whether these signs are the last remnants of a character in process of undergoing obliteration, or whether they indicate a new character coming into existence — a character most advanced in development in the Celebes, Buru and Siao birds — may possibly be ascertained some day. In *Pitta inspeculata* we are able to point to a character which is undoubtedly becoming obliterated.

+ * 110. PITTA PALLICEPS Brügg.

Siao Red Pitta.

a. **Pitta celebensis** pt. *(1)* Schl., Mus. P.-B. Rev. Pitt. 1874, 10 (Siao).

Pitta palliceps *(1)* Brüggem., Abh. Ver. Bremen 1876, V, 64, t. II, f. 7, 8, 9 (bill); *(2)* Salvad., Ann. Mus. Civ. Gen. 1876, IX, 54; *(3)* Meyer, Rowley's Orn. Misc. 1877, II, 327, 328; *(4)* id., Isis, Dresden 1884, 6; *(5)* Sclat., Cat. B. XIV, 1888, 436; *(6)* W. Blas., Ornis 1888, 602, 637; *(7)* Whitehead, Ibis 1893, 505; *(VIII)* Elliot, Mon. Pitt. pt. V, 1895, pl.

"Lihange mahamu", Siao, Nat. Coll.

Figure and descriptions. Elliott *VIII*; Brüggemann *1*; Sclater *3*.

Adult. Like *Pitta celebensis*, but the head and neck much paler, more yellow-chestnut, not bordered below with black across the hind neck, the vertical stripe apparently less developed; the secondaries green like the back, this colour extending half over the rump; the blue pectoral band not fringed below with black feathers, though the bases of these are black and a dark border may be seen; bill somewhat long and thin (Siao, 8. VII. 93: Nat. Coll. — C 12619).

Young in first plumage. Young-Robin-like *(Erythaca)*: above greyish olive-brown, with a greenish wash on the back and wings, tail and the outer edges of some of the quills greyish blue; lesser wing-coverts blackish; under-parts, including sides of neck and breast with pale buffish centres to the feathers, creating a mottled appearance; lower abdomen and under tail-coverts buff; on jugulum a buff cross-patch bordered below with blackish; the two white specula near the carpal edge and on the quills well developed; both mandibles yellowish white at tip (juv. Siao, 28. VII. 93: Nat. Coll. — C 12621).

Observation. In the type specimen Brüggemann makes no mention of green secondaries, and these, therefore, do not perhaps present a stable point of difference between this form and *celebensis*.

Measurements.	Wing	Tail	Tarsus	Bill from nostrils
a. (C 12619) ad. Siao	103	39	39	16
b. (C 12621) juv. Siao	94	34	39	12
c. (C 13527) ad. Tagulandang, Aug. 94	109	40	39	15
d. (C 13528) ad. Tagulandang, Aug. 94	107	40	41	16

Distribution. Siao (Hoedt *a 1*, v. Duivenb. *a 1*, Fischer *1*, Nat. Coll. in Dresden Mus.); Tagulandang (Nat. Coll.).

This form of Red Pitta is confined, so far as is known, to Siao and Tagulandang, two of the southern islands of the Sangi Group. The habitat of the type, originally indicated as "Sangir", has now been fairly satisfactorily settled as being Siao. Only 12 specimens in the Leyden, Darmstadt and Dresden Museums are on record, the majority being in immature plumage. *P. palliceps*, as Meyer has elsewhere *(3)* remarked, is undoubtedly only an insular variation of *P. celebensis*; the Great Sangi bird is somewhat further removed and resembles rather more closely *P. erythrogaster* of the Philippines; nevertheless *P. palliceps*, in virtue of its pale head, absence of all signs of a black ring round the hind neck, and of its similar blue pectoral collar and throat, is undoubtedly an approach towards *P. caeruleitorques* of Great Sangi. In fact the four forms afford regular transitions, just as do their respective habitats, and it is highly probable that Siao and Sangi served as stepping-stones and halting-places and became colonised by Red Pittas from Celebes or from Mindanao. In which direction this emigration took place may possibly be understood when the meaning of the disappearing (or growing) white speculum and vertical stripe of blue among other characters has been correctly interpreted.

As Prof. W. Blasius remarks *P. palliceps* is the only known species peculiar to Siao, unless indeed *Scops siaoensis* should prove to be distinct from *S. manadensis*, but further research will no doubt bring to light some peculiar forms.

† * 111. PITTA CAERULEITORQUES Salvad.

Sangi Red Pitta.

Pitta caeruleitorques *(1)* Salvad., Ann. Mus. Civ. Gen. 1876, IX, 53; *(II)* Rowley, Orn. Misc. 1877, II, 324, pl. LXIV; *(3)* Meyer, t. c. p. 327, 328; *(4)* Salvad., Atti Ac. Sc. Tor. 1878, XIII, 1187; *(V)* Gld., B. New Guinea, pl. 32 (1878); *(6)* Meyer, Isis, Dresden 1884, 6; *(7)* W. Blas., Ornis 1888, 601; *(8)* Sclat., Cat. B. XIV, 1888, 433; *(9)* Whitehead, Ibis 1893, 505; *(10)* M. & Wg., J. f. O. 1894, 246; *(XI)* Elliot, Mon. Pitt., pt. IV, 1895, pl.

Figures and descriptions. Rowley *II*; Gould *V*; Elliot *XI*; Salvadori *1*; W. Blasius *7*; Sclater *8*.

Adult. Like *P. celebensis* ad., but the head above and neck much paler yellowish chestnut — almost ferruginous, and without any blue vertical streak, the lower neck bordered against the mantle with a fringe of China-blue, like that of the pectoral band, without any intermediate black wing; the green parts of the upper surface somewhat greyer; throat and face darker and more russet; under parts similar, but the black band below the pectoral collar narrower (adult, Great Sangi: Meyer — Nr. 1910). "Iris brown; bill black; feet blue-grey" (Platen *7*).

Another specimen (1909) has the upper surface slightly bluer than in that taken for comparison.

Measurements (2 ex.). Wing 98, 101 mm; tail 36 c.; tarsus 38; bill from nostril 15.5, 16.

Distribution. Great Sangi (Meyer *II*, Bruijn *1*, *4*, Platen *7*).

Pitta caeruleitorques is intermediate between *P. palliceps* of Siao and *P. erythrogaster* of Mindanao and other Philippines, the former differing by its vertical stripe of pale blue, its greener back and absence of a blue collar above the mantle and of a black bar below the pectoral band, while *P. erythrogaster* has the pectoral band green, with only a small amount of blue in the middle of it and no black bar below, the blue and green tints of the upper surface much brighter, and the head above not uniform, but showing two dusky streaks on the sides of the crown. When Count Salvadori speaks of *P. caeruleitorques* and *erythrogaster* as the only two Red Pittas with a blue, cervical collar, he is not strictly correct, since this character is sometimes well developed in *P. celebensis*. It occurs again in the since described *P. propinqua* (if that species be really distinct from *P. erythrogaster*) and in *P. inspeculata*.

Prof. W. Blasius points out that in the specimen obtained by Dr. Platen the speculum on the primaries is developed only on the 3rd and 4th quills. This is also the case in the two adult examples in the Dresden Museum (and indeed the white is only seen on the inner web of the 3rd quill, but on both webs of the 4th), but an immature specimen has white on the inner web of the 2nd, on both webs of the 3rd and 4th and a trace on the 5th. In *P. celebensis*, *palliceps*, *erythrogaster* and *propinqua* it is seen on the inner web of the 2nd and on both webs of the 3rd and 4th, so that it appears certain that the speculum in *P. caeruleitorques* has undergone reduction. In the next article this matter is examined a little more fully.

† * 112. PITTA INSPECULATA M. & Wg.

Talaut Red Pitta.

Pitta inspeculata *(1)* M. & Wg., J. f. O. 1894, 245, pl. III; *(2)* iid., Abh. Mus. Dresd. 1895, Nr. 9, p. 6; *(III)* Elliot, Mon. Pitt., pt. V, 1895, pl.

"Angkaruii" or **"Antarawuwung"**, Kabruang, Salibabu and Karkellang, Nat. Coll.

Figures and descriptions. M. & Wg. *I*; Elliot *III*.

Adult. Head and neck ferruginous chestnut, rather darker on the sides of crown and of forehead, washed with bluish grey on middle of forehead, orbital region and cheeks; upper surface China-blue, a brighter fringe bordering the chestnut of the hind neck; bastard-wing and primaries black, the inner primaries washed externally with blue, no speculum; chin and throat dusky brown, forming into black upon the jugulum; pectoral collar China-blue all round, continuous with the blue of the mantle; remaining under parts deep scarlet; the sides bordering the wing blue; under wing-coverts slaty black washed with blue; longest under tail-coverts blue; quills and tail below shining black. (Type — ad. Kabruang, 7. XI. 93: Nat. Coll. — C 13174.)

The type is without any sign of a white speculum on either the primaries or against the metacarpal edge, though in a few other fully coloured specimens a small white spot or spots may be found on searching for such on the fourth primaries and near the metacarpal edge; a narrow black bar below the pectoral blue is also sometimes present.

Immature. Like the adult, but the throat and jugulum black varied with a few white or pale fawn-feathers, chin mostly cinnamon; a few pale fawn feathers on the abdomen; shoulder greenish tawny-olive; mantle varied with greenish olive; a small speculum formed by a white spot on the inner web of the 3rd quill and on the outer web of the 4th, just present also on the inner web. (Imm. co-type, Kabruang, 7. XI. 94; Nat. Coll. — C 13175.)

Distribution. Talaut — Karkellang, Kabruang and Salibabu (Nat. Coll. in Dresd. and Tring Museums).

The type and co-types of this species were obtained by native hunters sent out on behalf of the Dresden Museum; the species must be rather plentiful, six specimens being obtained in Kabruang and five in Salibabu. This was at the end of October and beginning of November, when the birds were moulting. Two large series were obtained in 1894 and 1896 in the larger island of Karkellang.

P. inspeculata is the only known Red Pitta in which the two specula on the wing are absent. From *Pitta celebensis* it differs by its back being blue, not green, by its wanting the blue vertical stripe, and rather broad black bar on the breast. It is most like *P. cyanonota* of Ternate and Guebeh in colour, but has the head darker chestnut, the blue of the back more intense, a cervical collar of brighter China-blue, not seen in *cyanonota*, the throat darker and the jugulum black; there is an entire absence or slight indication only of a black band below the blue pectoral collar. In respect of the blue cervical collar it agrees with *P. caeruleitorques* of Sangi and *P. erythrogaster* and *propinqua* of the Philippines, but is easily recognisable from the two last by its entirely blue upper surface and pectoral collar, and from *caeruleitorques* by its darker head, blue upper surface, blue sides, as well as middle, of the pectoral collar, and by the reduction or absence of the black band below it.

Pitta inspeculata is perhaps the most interesting member of the Red Pittas in virtue of the disappearance of the two white specula — on the primaries and against the carpal edge. An examination of the speculum on the primaries of the Red Pittas brings to light some interesting facts. We give a table showing the variation of the quill-specula of all the Red Pittas in the Dresden Museum at the time of writing (July 1894):

Species	Specimen	Distribution	2nd P.		3rd P.		4th P.		5th P.		Remarks
			out. web	inn. web	out. web	inn. web	out. web	inn. web	out. web	inn. web	
1. *P. mackloti* ♂ ad. . .	Nr. 13306	N. Guinea	.	.	.	*	*	*	*	*	
2. *P. mackloti* ♀ ad. . .	Nr. 1890	N. Guinea	.	.	.	*	*	*	*	*	
3. *P. mackloti* ♀ ad. . .	Nr. 1891	N. Guinea	.	.	.	*	*	*	*	.	Just seen on 5th inner.
4. *P. mackloti* ♂ ad. . .	Nr. 1893	Jobi . .	.	.	.	*	*	*	*	*	Just seen on 3rd outer.
5. *P. mackloti* ♂ ad. . .	Nr. 1896	N. Guinea	.	.	.	*	*	*	*	*	Indicated on 6th outer.
6. *P. mackloti* ♂ ad. . .	C 1417	N. Guinea	.	.	.	*	*	*	.	.	Just seen on 5th.
7. *P. mackloti* ♂ ad. . .	C 1431	Jobi . .	.	.	.	*	*	*	*	.	
8. *P. mackloti* ♀ ad. . .	C 1426	N. Guinea	.	.	.	*	*	*	*	*	Large.
9. *P. mackloti* ♀ ad. . .	C 1414	N. Guinea	.	.	.	*	*	*	*	.	

Species	Specimen	Distribution	2nd P. out. web	2nd P. inn. web	3rd P. out. web	3rd P. inn. web	4th P. out. web	4th P. inn. web	5th P. out. web	5th P. inn. web	Remarks
10. *P. mackloti* ad. . . .	C 1432	Jobi . .	.	.	.	*	*	*	*	*	Large.
11. *P. mackloti* ad. . . .	C 1435	Jobi . .	.	.	.	*	*	*	*	*	
12. *P. mackloti* ♂ ad. . .	C 1423	N. Guinea	.	*	*	*	*	*	*	.	On 3rd & 5th out. small.
13. *P. mackloti* ♀ ad. . .	C 1416	N. Guinea	.	.	.	*	*	*	*	.	On 5th inner slightly.
14. *P. mackloti* ♂ ad. . .	C 7105	Aru . .	.	.	.	*	*	*	.	.	Moulting.
15. *P. mackloti* ♂ imm. .	C 1425	N. Guinea	.	.	.	*	*	*	.	.	
16. *P. mackloti* ♂ imm. .	C 1428	N. Guinea	.	*	*	*	*	*	*	*	
17. *P. mackloti* ♀ imm. .	C 9962	N. Britain	.	*	.	*	*	*	.	.	
18. *P. mackloti* ♂ imm. .	Nr.1897	N. Guinea	.	.	.	*	*	*	*	*	
19. *P. mackloti* ♀ imm. .	Nr.1895	N. Guinea	.	.	.	*	*	*	*	*	Small on 5th.
20. *P. mackloti* ♀ imm. .	Nr.1892	N. Guinea	.	.	.	*	*	*	*	*	Small on 5th.
21. *P. mackloti* ♂ imm. .	Nr.1894	N. Guinea	.	.	.	*	*	*	*	*	
22. *P. rufiventris* ♂ ad. .	M.13304	Batjan. .	.	.	.	*	*	*	.	.	
23. *P. rufiventris* ad. . .	Nr.6990	Moluccas .	.	.	.	*	*	*	*	*	On 5th bilat. unequal.
24. *P. rufiventris* ad. . .	Nr.1888	Halmahera	.	*	.	*	*	*	*	*	Small on 2nd and 5th inn.
25. *Pitta* juv..	—	"Moluccas"	.	*	*	*	.	.	.	.	
26. *P. cyanonota* ad. . .	Nr.1889	Ternate .	.	.	.	*	*	*	.	.	Moult., formula doubtf.
27. *P. celebensis* ad. . . .	C 10886	Celebes .	.	*	*	*	*	*	.	.	Large.
28. *P. celebensis* ad. . . .	C 10879	Celebes .	.	*	*	*	*	*	.	.	
29. *P. celebensis* ad. . . .	Nr.1908	Celebes .	.	*	*	*	*	*	*	.	Very small on 5th.
30. *P. celebensis* ad. . . .	Nr.1907	Celebes .	.	*	*	*	*	*	*	.	Large.
31. *P. celebensis* ♀ ad.. .	P.&F.S.	Celebes .	.	*	*	*	*	*	.	.	Indicated on 5th outer.
32. *P. celebensis* imm. . .	C 12199	Celebes .	.	*	*	*	*	*	.	.	Indicated on 5th outer.
33. *P. palliceps* ad. . . .	C 12619	Siao . .	.	*	*	*	*	*	.	.	
34. *P. palliceps* juv. . . .	C 12621	Siao . .	.	*	*	*	*	*	*	.	
35. *P. erythrogaster* ad.. .	Nr.6988	Philippines	.	*	*	*	*	*	*	.	Just seen on 5th inner.
36. *P. erythrogaster* ad.. .	Nr.3243	Luzon . .	.	*	*	*	*	*	.	.	Just seen on 2nd outer.
37. *P. erythrogaster* ♀ ad.	M.13503	Mindanao.	.	*	*	*	*	*	.	.	
38. *P. propinqua* ♂ ad .	M.12845	Palawan .	.	*	*	*	*	*	.	.	
39. *P. caeruleitorques* ad. .	Nr.1909	GreatSangi	.	.	.	*	*	*	.	.	
40. *P. caeruleitorques* ad. .	Nr.1910	GreatSangi	.	.	.	*	*	*	.	.	
41. *P. caeruleitorques* ♀ imm.	C 4185.	GreatSangi	.	*	*	*	*	*	.	.	On 5th just indicated.
42. *P. inspeculata* ad. . .	C 13174	Talaut. .	.	.	.	.	.	.	.	.	Speculum quite absent.
43. *P. inspeculata* ad. . .	C 13119	Talaut. .	.	.	.	.	.	.	.	.	Spec. quite abs., moult.
44. *P. inspeculata* ad. . .	C 13116	Talaut. .	.	.	.	.	.	.	.	.	Spec. quite abs., moult.
45. *P. inspeculata* ad. . .	C 13120	Talaut. .	.	.	.	.	*	.	.	.	A small spot.
46. *P. inspeculata* ad. . .	C 13118	Talaut. .	.	.	.	.	*	.	.	.	A spot on left wing only.
47. *P. inspeculata* ad. . .	C 13117	Talaut. .	.	.	.	.	*	.	.	.	A minute spot.
48. *P. inspeculata* imm. .	C 13175	Talaut. .	.	.	.	*	*	*	.	.	Very small on 4th inner.

Further specimens subsequently received from Talaut prove that the white speculum is not always better developed in young individuals.

The above tables show first that the quill-speculum in the Red Pittas is very variable, and indeed it is impossible to indicate all the slight differences in size and shape of the spots in specimens from the same locality and on the right or left wing of the same individual; secondly that Papuan, and, apparently,

also Moluccan, specimens generally have none of the speculum on the second quill, but on the 3rd, 4th and 5th; thirdly that Celebesian and Philippine specimens generally have none of the speculum on the 5th quill, but on the 2nd, 3rd and 4th. As several exceptions to this rule are shown above, a few Papuan specimens having the speculum commencing on the second quill, as in Celebes birds, and a few Celebes birds having it carried on as far as the fifth quill, as in Papuan ones, we must, apparently, infer that the speculum, was originally, larger than at present and embraced a part of the 2nd, 3rd, 4th, 5th and, judging from Nr. 5, 6th quills; and that on the 6th it is now almost entirely lost, while Papuan birds have further lost it almost for good on the 2nd, and Celebes and Philippine ones on the 5th. It appears likely enough that at one time the white was more extended, for the speculum appears almost throughout the varied genus *Pitta*, and in some forms, such as *P. sangirana* and *P. cyanoptera* (members of different groups), the white occupies the whole of the ten primaries except the basal portion and ends of the feathers and inner web of the tenth. In other species, such as the beautiful *P. granatina* and *ussheri* of Borneo and *P. forsteni* of Celebes, the speculum has completely disappeared.

Some species, as Mr. Whitehead remarks, have increased the amount of white on the primaries, at least in *P. atricapilla*, *muelleri* and *sangirana* it is more extended in the adult than in the young.

The adult *P. caeruleitorques* of Sangi seems to have lost it on both the 2nd and 5th, while in the adult *P. inspeculata* of Talaut it is found only as a small spot on the fourth quill or is entirely wanting on all of them. In one immature *P. inspeculata* a moderate speculum still makes its appearance, and in the immature *palliceps* and *caeruleitorques* it seems to be a good deal more extended than in the adult; this is not the case in immature Papuan specimens. — It seems certain that there once existed in the Red Pittas and in many of their fellows, and, apparently, still exists, a tendency to lose the white speculum; but what causes set the process of obliteration at work must be a matter of conjecture. We believe, however, from the existence of volcanoes there, that Sangi and Talaut are not fragments of a former continent, but have been upheaved from the sea, and therefore colonised by flight, or through the agency of winds or sea-currents; and when *Pitta* got there, it is perhaps more likely that it would vary than if it had stayed at home, and the obliterating process of the speculum, if nearly latent before, might be brought to greater activity.

It is possible that a melanising influence exists in Talaut, but this is very doubtful. The Talaut *Oriolus* is melanotic, and the *Dicaeum* is darker than its nearest allies. On the other hand the black borders on the wing of the *Eos* are narrower than in Sangi.

Pitta cyanonota Temm. Two specimens of this species of Ternate and Guebeh purporting to have come from Celebes are in the British Museum, but

the habitat is very rightly queried by Sclater (Cat. B. XIV, 435). No collectors' names are mentioned, and there can be little doubt that the labels are erroneous.

Pitta rufiventris Cab. & Heine. The same remark applies to a young specimen of this bird labelled "Celebes" in the same collection (l. c. p. 434).

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† * 113. PITTA FORSTENI Bp.

Celebes Green Pitta.

a. **Pitta melanocephala** *(1)* Müll. & Schl. (nec Wagl.), Verh. Natuurk. Comm. 1839—44, Aves, Pitta, p. 19 (ex Forsten MS.); *(2)* Gray, Gen. B. I, 214 (1846); *(III)* Westerm., Bijdr. t. d. Dierk. 1854, I, 46, Pitta, pl. II; *(4)* Schl., Handl. Dierk. 1857, 254; *(V)* id., Vog. Ned. Ind. 1863, 5, 30, pl. II, f. 1; *(6)* id., Mus. P.-B. Pitta 1863, 4; *(7)* Finsch, Neu-Guinea 1865, 167; *(8)* Schl., Rev. Pitt. 1874, 9; *(9)* Rosenb., Malay. Archip. 1878, 272; *(10)* W. Blas., Ornis 1888, 598.

b. **Brachyurus forsteni** *(1)* Bp., Consp. 1850, I, 256; *(II)* Elliot, Mon. Pitt. 1863, pl. XXIV; *(3)* id., Ibis 1870, 419.

c. **Melanopitta forsteni** *(1)* Bp., Consp. Vol. Anisod. 1854, 7; *(2)* Wald., Tr. Z. S. 1872, VIII, 62; *(3)* Meyer, Ibis 1879, 126; *(4)* W. Blas., J. f. O. 1883, 132; *(5)* Platen, Gefied. Welt 1887, 218.

Pitta forsteni *(1)* Wall., Ibis 1864, 106; *(2)* Gray, HL. 1869, I, 295, Nr. 4363; *(3)* Wald., Tr. Z. S. 1875, IX, 189; *(4)* Rowley, Orn. Misc. II, 1877, 331, note; *(V)* Gould, B. New Guinea IV, pl. 30 (1879); *(6)* Sclat., Cat. B. XIV, 1888, 442; *(7)* White-head, Ibis 1893, 490, 499; *(VIII)* Elliot, Mon. Pitt. 1895, pt. V, pl.; *(9)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 13.

"Mopo idiu" (Green Grandfather), Minahassa, Meyer *c 3*.

Figures and descriptions. Gould *V*; Elliot *b II*, *b 3*, *VIII*; Westermann *a III*; Schlegel *a V*; Sclater *5*; Whitehead *7*.

Adult. Entire head all round, neck and upper throat glossy velvety-black; upper surface glossy green, showing bright yellow, malachite or dark olive tints according to the light; sides of neck, jugulum, breast and sides of body bluer green, similarly variable; primaries, bastard-wing and concealed portion of secondaries black; exposed portion of secondaries and innermost primaries, greatest wing-coverts and tail green, darker than the back; lesser wing-coverts and upper tail-coverts metallic silver-blue; abdomen and under tail-coverts deep scarlet; a patch of black separating the abdomen from the breast; entire under side of wing and tail shining black. (♂ ad. Rurukan, 17. I. 83: Platen in Mus. Nehrkorn, Nr. 946; ♀ ad. on the Gunung Sudara, Minahassa, 15. X. 93: P. & F. Sarasin Nr. 105). "Iris dark; bill black; legs grey" (Sarasins, MS.).

Measurements (6 ex. in the Sarasin Collection, and 4 Dresden Mus.). Wing 116—126 mm; tail c. 40—47; tarsus c. 39—44; bill from nostril c. 16—17.

Nestlings. Two in the Sarasin Collection are partially covered with pin-feathers, those along the sides of the body pale fulvous, the rest lead-colour. The arrangement of the ten primaries and twelve rectrices is well seen. "In stomach: remains of insects" (4. June, 1894: P. & F. S.). The mother and the nest accompanying.

Eggs. "Dr. Platen found on May 6th, 1886, a nest with 2 eggs near Rurukan in the Minahassa. They differ from one another:

a, has dark brown surface spots on a white ground;
b, light brown ones on a like ground.
Both eggs measure 30 × 23.5 mm. In the delicacy of the markings they differ little from other *Pitta*-eggs" (Nehrkorn, MS.).

Nest. The nest obtained by the Sarasins with the above two nestlings is a most curious object. In shape a cylinder, closed at one end, or a large pocket, about 22 cm long by about 12 in external diameter. "According to the statement of the finder, the nest was situated on the ground; it represents a moss cylinder, open in front, and shut off by a tree-stem behind" (P. & F. S.). The side which seems to have lain on the ground is composed almost entirely of dark vegetable-fibres, the upper surface and sides chiefly of moss; the dark fibres form the internal structure.

Distribution. North Celebes: Minahassa (Forsten *a 1*, *a 6*, Meyer *c 3*, etc.), Gorontalo Distr. (Riedel in Dresd. Mus.).

The Green Pitta of Celebes is a rare bird in collections, and is known only from the Northern Peninsula of the island. It was not obtained by Wallace or von Rosenberg; Meyer found it a difficult bird to shoot and met with it only near Manado in December, 1870, and once again later, and Platen observed both it and *P. celebensis* beneath the underwood in the forest near Rurukan. In the stomach the Sarasins found insects.

P. forsteni is well distinguished from *P. sangirana* of Great Sangi, *P. muelleri* of Borneo and *P. atricapilla* of the Philippines by its primaries being entirely black like the rest of the wing, instead of, as in these three species, white with the basal part and distal ends black. In respect of the wing *P. forsteni* more nearly resembles *P. novaeguineae* M. & S. and its allies of the Papuan group, but these birds, having the black of the throat carried further down on to the jugulum, the sides of the abdomen blue or washed with blue, and a different green on the breast, seem to be rather further removed. In *P. mafoorana* Schl., as in *P. forsteni*, no white speculum is seen; in *P. novaeguineae* and *rosenbergi* it is very small. The variation of the quill-speculum is much more striking than in the Red Pittas, it seems to be undergoing, or has already undergone, obliteration east of Celebes, but to be on the increase north and west. The group, numbering 11 or 12 species (see Sclater *6*, Whitehead *7*), ranges from the Himalayas to New Guinea and North Australia.

† * 114. PITTA SANGIRANA (Schl.).

Sangi Green Pitta.

a. **Pitta atricapilla sanghirana** *(1)* Schl., Ned. Tdschr. Dierk. III, 1866, 190.
Pitta sanghirana *(1)* Elliot, Ibis 1870, 411; *(2)* Salvad., Ann. Mus. Civ. Gen. IX, 1876, 54; *(III)* Rowley, Orn. Misc. II, 1877, 329, pl. LXV; *(4)* Meyer, t. c. 330; *(5)* W. Blas., Ornis 1888, 597; *(6)* Sclat., Cat. B. XIV, 1888, 440; *(7)* Whitehead, Ibis 1893, 499.
b. **Pitta atricapilla** pt. *(1)* Schl., Rev. Pitt. 1874, 5 (Sangi).
"Kopau", Great Sangi, Nat. Coll.
For further synonymy cf. W. Blasius *5*.

Adult. Similar to *P. forsteni*, but the green above and below darker, the blue on the wing-coverts, upper tail-coverts and rump (where it is more extended) darker, upper abdomen black, the lower abdomen and under tail-coverts scarlet, primaries white, tipped about 20 mm broad on the 1st, about 2 mm broad on the inner ones — with black, and with the bases of the feathers black (ad. Great Sangi, 31. VII. 93: Nat. Coll. — Nr. 12700). Iris brown; bill black; feet blue-grey or grey-reddish (Platen *5*).

Immature. Head above and under-parts rufous isabella-colour, almost buff on chin and throat, sides of the body green, breast varied with green; neck and nape blackish; back and mantle green, nearly as in adult; wings chiefly broccoli-brown, no silver-blue on the lesser coverts; the white on the primaries much less extended than in the adult, the first quill black, the white commencing on the inner web of the second (Gt. Sangi: Meyer — Nr. 1916).

Nestling. Much more dusky than the immature bird: head all round neck and chin black, throat varied with buff; upper surface dusky bottle-green; uropygium bluish; upper tail-coverts brighter blue; the white on the quills distributed as in the immature bird, rest of the quills and tail black, under-parts brownish, paler on abdomen, bill black, yellower towards the gape, and the tips of both mandibles yellowish: wing 92 mm; tail 25; tarsus 40; bill from nostril 11 (Great Sangi, 16. VII. 93: Nat. Coll. — C 12702).

Measurements (23 adults: W. Blasius *5*). Wing 102—111 mm; tail 34—45; culmen 21—24.5; tarsus 39—43.

Distribution. Great Sangi (Rosenberg *a 1*, *b 1*, Hoedt and v. Duivenbode *b 1*, etc.).

A fine series of 25 examples of this species obtained by Dr. Platen and his hunters passed into the hands of Prof. W. Blasius in 1888, who, after pointing out that the white on the quills is least extensive in young birds and very variable in extent in fully coloured individuals, remarks that *P. atricapilla* Less. of the Philippines, one of its nearest allies, is smaller and has a very much lighter, almost yellowish green tint on the back and under-parts. *P. muelleri* (Bp.) of Sumatra and Borneo is lighter green above, lighter and bluer green below, has the lesser wing-coverts and the tail-coverts slightly more silvery and paler blue, the black on the abdomen less extended, and the bill, apparently, smaller. Whether these differences are bridged over by individual variation we have insufficient material to judge; if such is the case, then *sangirana*, *muelleri* and the *typical atricapilla* should be reduced to the rank of subspecies.

Unlike *P. forsteni* in Celebes the present species seems to be rather plentiful in Great Sangi, and it is curious that 20 of Dr. Platen's 25 examples were males and only 3 adult females. Though very difficult to approach under ordinary circumstances, it is well known to East Indian hunters that by imitating the call-note the bird can be drawn almost to the muzzle of the gun. Perhaps, in the case of our species, the male bird answers better to the call of the hunter.

115. PITTA CYANOPTERA Temm.

Chinese Blue-winged Pitta.

Pitta cyanoptera *(I)* Temm., Pl. Col. pl. 218 (1823); *(II)* Schl., Vog. Ned. Ind. Pitta 1863, 9, 32, pl. 4, fig. 1; *(3)* Salvad., Cat. Ucc. Borneo 1874, 235; *(4)* W. Blas., "Braun-

schweig. Anzeigen" (newspaper!), 3. März 1886; *(5)* Sclat., Cat. B. XIV, 1888, 420; *(6)* Sharpe, Ibis 1889, 442; *(7)* Whitehead, l. c. notes; *(8)* Everett, J. Str. Br. R. A. Soc. 1889, 147; *(9)* Sharpe, ib. 1890, 281; *(10)* Oates, ed. Hume's Nests & Eggs Ind. B. 1890, II, 283; *(11)* Oates, Faun. Brit. Ind. B. II, 1890, 392; *(12)* Hose, Ibis 1893, 403; *(13)* Whitehead, t. c. 494; *(14)* Sharpe, Ibis 1894, 421, 544.

a. **Brachyurus cyanopterus** *(1)* Elliot, Mon. Pitt. 1863, pl. IV.

b. **Pitta moluccensis** *(1)* Oates, Str. F. V, 1877, 149; *(2)* David & Oust., Ois. Chine 1877, 144; *(3)* Hume & Davis., Str. F. VI, 1878, 240; *(4)* Oates, B. Brit. Burmah 1883, I, 415.

For synonymy and further references see Salvadori *3*; Sclater *5*.

Figures and descriptions. Temminck *I*; Schlegel *II*; Elliot *a I*; David & Oustalet *b 4*, *11*; Sclater *5*.

Adult. Head above isabella-colour, with a black vertical stripe; face, sides of head, and neck black; back, scapulars and inner quills olive-green variable in different lights; upper wing- and tail-coverts glossy intense campanula-blue; bastard wing and secondaries black, the latter edged with bluish; primaries white, their bases and the ends of the outer ones black; tail black, tipped with bluish; throat white; under parts cinnamon-buff; middle of abdomen scarlet, paler on under tail-coverts; under wing-coverts black (Baram, N. W. Borneo, Nr. 13305). Iris black; bill dark brown; legs pale pink (Whitehead *7*).

Sexes. Said to be similar.

Young. They have the coronal streak broader, and the feathers of the crown are narrowly margined with black; wing-coverts dull blue, the other parts less bright than in the adult (Oates *11*).

Eggs. "Both the eggs in my collection were collected by Oates in Pegu. They belong to two different clutches, of which the two fellow specimens were in the former Seebohm collection (now British Museum). The larger example measures 30 × 22.5 mm, has a white ground, with washy lilac-grey subjacent, and a few small dark brown superjacent spots. The eggs have resemblance with those of *Chibia hottentotta*, *brevirostris* and *laemosticta*. Nr. 2 is considerably smaller and measures 26 × 21 mm. The large brown surface spots are vermiform and evenly distributed over the whole egg. Dates: Nr. 1, June 27th, 1877; Nr. 2, June 20th, 1878" (Nehrkorn MS.). Hume *(b 1)* describes the eggs as "far more thickly marked and richly coloured than those of any other Ground Thrushes with which I am acquainted". Davison found as many as 6 in a nest; Oates says 4—6.

Nest. A huge structure of sticks, leaves and roots, bound together with earth, placed on the ground in an open place or against the root of a tree; globular in shape, the entrance at one side close to the ground (Oates *b 4*).

Distribution. Arakan (Blyth *3*, Oates *b 4*); Pegu (Oates *b 4*); Tenasserim (Beavan *3*, Davison *b 3*); Corea (David *b 2*); South China (Swinhoe *3*, David *b 2*); Siam and Cambodia (Brit. Mus. *5*); Malay Peninsula (Moore, Wallace *3*, etc.); Sumatra (Raffles etc. *3*); Borneo (Whitehead, etc. *8*); Celebes — Minahassa (Platen *4*); ?Java (Temm. *3*, Elliot *3*); ?Luzon (Mus. Turin *3*).

This *Pitta* is a migrant; there is, therefore, nothing very surprising in the discovery of an example at Rurukan in the Minahassa by Dr. Platen in 1884—85. Burmah and Tenasserim are known as its breeding-grounds, from where it disappears, except from S. Tenasserim, in the winter or dry season (cf. Davison *b 3*, Oates *b 4*, *11*, Hume *b 1*). On Tega Island, Borneo, Mr. John Whitehead

met with it in numbers during April 1886, but in the following year Mr. Everett sent a collector to that island, where he procured numbers of *Pitta muelleri*, and no *P. cyanoptera.* When Mr. Whitehead visited the island there were no *P. muelleri* to be seen. This species *(cyanoptera)* is fairly plentiful in Labuan in some seasons; at other times it is not to be met with *(7)*. Mr. Whitehead remarks that this species "takes flight more often when alarmed than *P. ussheri* or any other species of this genus that I have met with", as might indeed be expected in a form given to making especially long journeys on the wing. Its absence or rarity in the Philippines is instructive; its route of migration, like that of *Lanius tigrinus*, seems to be a southern one. In some quarters it seems to occur all the year round; according to Mr. Hose *(12)*, this is the case in the Baram District of Borneo, and, according to Mr. Oates, in Southern Tenasserim.

Davison *(b 3)* makes the following remarks on the habits of this bird: "This species is fond of perching on trees; you may continually see them high up upon high trees calling vociferously. They are not at all wild or shy birds; they feed freely on ants and their larvae, all insects, grubs, and land shells. I never noticed this or any of its congeners coming to the water to drink. This and the closely-allied *P. megarhyncha* seem to frequent most commonly thin tree jungle, where there is not much underwood, and the mangrove swamps, but they also occur abundantly in gardens and plantations. They both have a fine clear double note, which may constantly be heard in the morning and evening wherever they occur. They are decidedly noisy and often call all day, and on moonlight nights a great part of the night also".

P. megarhyncha Schl., which this excellent field naturalist cites as a close ally of the present species, is recognisable, as Hume shows (Str. F. VI, 242), by its much longer, slenderer and excessively straight-culmened bill, the duller and darker brown of the head, the absence of the black vertical stripe, the narrower black collar, etc. *P. nympha* T. & S. of China and Formosa, *P. brachyura* (L.) of India and Ceylon to Tenasserim and *P. irena* of Timor, Sula, Boano near Ceram and Ternate are distinguishable at a glance by their having the blue of the wings confined to the lesser coverts, and turquoise, instead of campanula-blue, and the white on the primaries restricted to a speculum.

+ 116. PITTA IRENA Temm.

Buff-browed Pitta.

a. **"Brève irene"** *(1)* Temm., Pl. Col. 591 (1836).

b. **Pitta crassirostris** *(1)* Wall., P. Z. S. 1862, 188, 335, 339 (Sula); *(2)* id., Ibis 1864, 104, 106; *(3)* Finsch, Neu Guinea 1865, 167; *(4)* Gray, HL. 1869, I, 295, Nr. 4348; *(5)* Sclat., Cat. B. XIV, 1888, 427.

c. **Pitta brachyura** *(1)* Schl. (nec Linn.), Vog. Ned. Ind. Pitt. 1863, 13, 33, pl. 3, fig. 2, 3; *(2)* id., Mus. P.-B. Pitt. 1863, 11; *(3)* id., Rev. Pitt. 1874, 14.

Pitta irena Temm., *(1)* Salvad., Orn. Pap. II, 1881, 391; *(2)* Sclat., Cat. B. XIV, 1888, 427; *(3)* Salvad., Agg. Orn. Pap. 133 (1890); *(4)* Whitehd., Ibis 1893, 497.

"**Lihange**", Tagulandang, Nat. Coll.

For further synonymy and references cf. Salvadori *1, 3.*

Figures and descriptions. Temminck *a I*; Schlegel *c 1*; Wallace *b 1*; Salvadori *1*, Sclater. *b 5, 2*, Whitehead *4.*

Adult. Entire head, hind neck, chin and middle of throat black; superciliary stripe from forehead to nape deep buff; upper surface changeable olive-green; lesser wing-coverts and tail-coverts turquoise-blue; primaries black, tips greenish, a white speculum formed on the 2nd to 6th quills; secondaries edged externally with bluish green; tail black, tipped with green; under-parts deep buff, darker on the breast and sides; abdomen dark red, the bases of the feathers black; crissum and under tail-coverts more scarlet: wing 117 mm; tail 41; tarsus 39; bill from nostril 15.5 (ad. Tagulandang Id., Aug. 1894, C 13526). Bill black, base of lower mandible horny, feet pale horn or flesh-colour, iris dark (Sula — Wallace *b 2*).

Distribution. Timor (S. Müller *c I*); Tagulandang Id. between Celebes and Sangi (Nat. Coll.); Sula Besi and Sula Mangoli (Allen *b 1*, [*b 5*, Hoedt *c 3*); Ternate (Bernstein *c 2*, Bruijn *1*); Boano off Ceram (Hoedt *c 3, 1*). (S. Müller *c I* states that he met with it also in Samao near Timor).

This species presents another of those cases in which two leaders in ornithology handle the same subject in different manners. The Sula bird is said to have a thicker, more compressed bill than that of Timor (we do not find that Timor birds are otherwise smaller, judging from one before us), and Mr. Wallace's name *crassirostris* is allowed to stand for the Sula form by Mr. Sclater, while Count Salvadori finds no sufficient grounds for its separation as a species. It appears likely enough that the peculiarities of the Sula bird are not great enough to warrant its position as a distinct species, but that occasional individual variation connects it with Ternate and other examples. The occurrence of this species on Tagulandang is comparable to the presence of *Columba albigularis* there.

† * 117. PITTA VIRGINALIS Hart.

Djampea Buff-browed Pitta.

Pitta virginalis *(1)* Hart., Nov. Zool. 1896, 174, 182.

Description. Hartert, *l. c.*

Diagnosis. Differs from *Pitta irena* by having the deep buff superciliary stripe about twice as broad; the chin black for about 10 mm only as against about 25 mm in *P. irena*; size a little smaller.

Measurements. Wing 103—109 mm; tail 38—39; tarsus c. 38; bill from nostril c. 15 (Hartert *1*, and ♀ Djampea, Dec. 1895: Everett — C 14864).

Distribution. Djampea (Everett).

This was the only *Pitta* found by Mr. Everett on Djampea Island; none were sent from Kalao or Saleyer, where they certainly also occur. It belongs to the same group as *P. irena* of Timor and the Moluccas to Sula and Tagulandang, *P. concinna* of Lombok and Flores, *P. maria* of Sumba, and *P. vigorsi*

of Banda and Timorlaut. *P. irena*, *concinna* and *maria* are distinguishable by having much more black on the chin and throat, *P. vigorsi* by having no black here, and by other points (cf. Hartert, Nov. Zool. 1896, 175, 585).

FAMILY HIRUNDINIDAE.

The Swallows are birds of aerial habits, taking their insect-food on the wing. For the rest, they may be best recognised by the small, flat, triangular bill, and by their possessing only nine primaries. They belong to Gadow's *Diacromyodine* group of *Passeres* in virtue of the arrangement of the muscles of the syrinx.

The family belongs both to the Old and New Worlds. There are only a few species in Australia and Papuasia, and these seem to have got there by flight. The genus *Hirundo* only is represented in Celebes.

GENUS HIRUNDO L.

The true Swallows, with a flat, triangular bill; the tail forked to nearly square; the wing long, the first and second quills the longest and the secondaries about half their length; the secondaries with double, or heart-shaped, tips; the tarsus small and bare, about as long as the hind toe and claw; the plumage with a metallic gloss on the upper surface. "They all construct nests of mud lined with feathers, some making their nests cup-shaped, while others add a long tubular entrance. The eggs in some species are speckled, in others white without any marks" (Oates). By their nidification, as well as by their other habits, they show a certain amount of correspondence with some Swifts, for instance, *Collocalia*, differing herein from other *Passeres*.

Two species in Celebes, one a migrant, and both widely distributed elsewhere, and doubtless birds which have extended their range by flight over sea.

118. HIRUNDO RUSTICA L.

Common Swallow.

The Common Swallow is almost cosmopolitan in its range, extending north to about the polar circle, south in winter to the Cape, North Australia, and South Brazil; absent in the Pacific Islands[1]), and New Zealand, and apparently in Madagascar. Within this area it varies considerably and has been divided into a number of species. Sharpe recognises five races or subspecies, other

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1) Except the Pelew Islands, from where there is a specimen in the British Museum, fide Sharpe, Cat. B. X, 137, a record overlooked by Wiglesworth in "Aves Polynesiae". Schmeltz (Ethn. Abth. Mus. Godef. 1881, 391) speaks of *Hirundo rustica* and *Chelidon urbica* as occurring at Yap in the Carolines, but no reference to actual specimens is made, though they may have been in the Museum Godeffroy.

writers make other subdivisions. What is necessary to know is where the extremes of variation in particular directions are found; the intermediate forms, which probably compose the larger half of the species can then be indicated by hyphens connecting the names of the races between which they lie. Thus, in Japan Dr. Sharpe seems to have discovered the summer head-quarters of one extreme, in Europe another extreme is found, i. e. the *typical H. rustica* with the black breast-band unbroken: "there is never any difficulty in recognizing birds from Japan as unmistakeable *H. gutturalis* with the breast-band completely divided [by the chestnut of the throat breaking through it]; and I have never seen an intermediate or doubtful specimen from the Japanese Islands". Celebes and the other East Indies are without doubt the winter habitat of the true *H. rustica gutturalis*, and one of the Celebes specimens before us may be thus identified. Further, Sharpe records the *typical rustica* from Malacca, the Philippines and Batchian — a record overlooked by Count Salvadori — and from Palawan and Borneo (Ibis 1888, 200; 1893, 561) and with Mr. Wyatt later from Celebes, Halmahera, Buru and Amboina (Mon. Hirund. pt. XVII, 1893); other specimens from Celebes, Java, Luzon, etc., after the finding of these authors, do not admit of such positive identification, but are intermediate between the typical and the Japanese races like three others from Celebes and elsewhere before us. These are best indicated as *H. rustica — gutturalis*, a less clumsy method not being possible with the present system of nomenclature. The following literature relates to the occurrence in the Celebes Province of:

4. **Hirundo rustica gutturalis** (Scop.) and **H. rustica — gutturalis.**

a. **Hirundo gutturalis** (Scop.), *(1)* Wald., Tr. Z. S. 1872, VIII, 65; *(2)* Meyer, J. f. O. 1873, 405; *(3)* Salvad., Ann. Mus. Civ. Gen. 1876, IX, 55; *(4)* Meyer, Ibis 1879, 128; *(5)* Salvad., Orn. Pap. 1881, II, 1; *(6)* Meyer, Isis, Dresden 1884, 6, 22; *(7)* Sharpe, Cat. B. X, 1885, 134; *(8)* W. Blas., Ztschr. ges. Orn. 1886, 108; *(9)* id., Ornis 1888, 580; *(X)* Sharpe & Wyatt, Mon. Hirund. pt. XVII pl. (1893).

b. **Hirundo rustica** *(1)* Rosenb., Malay. Archip. 1878, 271; *(II)* Sharpe & Wyatt, Mon. Hirund. pt. XVII pls. (1893); *(3)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 8.

Figures and descriptions. Sharpe & Wyatt *a X*, *b II*; Salvadori *5*; Sharpe *7*; W. Blasius *8*.

Adult male *(H. rustica gutturalis).* Above glossy steel blue-black; wings and tail dusky, the rectrices, except the two middle ones, furnished with a large spot of white on the inner webs 5—10 mm from the tip, the outermost rectrices much lengthened and narrow, forming a deep fork; forehead, chin, and throat chestnut, on sides of neck a blue-black collar, broken through on the upper chest by the colour of the throat; under surface light pinkish buff (Macassar, ♂, Jan. 1873 — C 510). Wing 114 mm; tail (middle rectrices) 42; tail (outer rectrices) 93; tarsus 10, rictus 15.

Sexes. They are similar (Sharpe).

Immature. Like the adult, but the head above dusky brown; chin, throat, and forehead at base of upper bill cinnamon; a broad pectoral collar dusky glossed with blue-black (Macassar, ♂, Jan. 1873 — C 571: apparently, *H. rustica—gutturalis*).

Eggs. North India and Afghanistan — *H. rustica* — 3—6 in number; white to pale salmon-

pink, spotted and speckled with brownish red and inky purple: size 17.8—21.3 × 12.7—14 mm (Oates ed. Hume's Nests and Eggs Ind. B. 1890, II, 184). The eggs of *H. gutturalis* do not differ from those of *rustica*, are only a little smaller (Nehrkorn MS.).

Nest. An open, saucer-shaped, or half-saucer-shaped, structure of mud, fixed upon or against a beam or such like under cover, lined with feathers, etc. It is doubtful whether this species breeds in Celebes.

Distribution in the Celebes Province. Great Sangi (Bruijn's Coll. *a 3*, *a 9*); Minahassa (Meyer *a 4*, Riedel *a 8*); Togian Islands (Meyer *a 4*); Southern Peninsula of Celebes (Meyer *a 4*).

H. gutturalis is recorded by Salvadori from most of the East India Islands as far as the north coast of Australia, by Sharpe *(a 7)* from the Pelew Islands, by Seebohm (Ibis 1890, 102) from the Bonin Islands, where two specimens were observed for one day only, one being shot.

Taczanowski (Faun. Orn. Sib. Orient. 1891, I, 173) records this race as far north as Kamtschatka. Hartert has recently noted its occurrence in the Natuna Islands and Sumba (Novitates Zool. 1894, 480; 1895, 471; 1896, 585), Bourns and Worcester in several additional islands of the Philippines.

Specimens captured at sea near the East Indies are recorded by Sharpe *(a 7)*, by Finsch & Conrad (Verh. z.-b. Ges. Wien, 1873, p. 1 sep. copy), by the "Challenger" (see *a* X), and there is a specimen in the Dresden Museum taken by Meyer in the China Sea more than 100 miles west of Borneo, end of April, 1872. Though in the main a migrant, it is possible that some individuals of this species remain to breed in the East Indies. It was obtained by Meyer on the Togian Islands in August, and it has been recorded from Amboina in May, Tifore in August, New Guinea in June *(a 5, a 7)*.

Only two Swallows are known from Celebes, the present species and *H. javanica*, which latter may be distinguished by the absence of the black pectoral collar and by its brownish grey — not white and buffy — under surface; also it does not acquire the long forked tail of *H. rustica*, having the outer rectrices only a little (in the adult about 10 mm) longer than the middle ones.

119. HIRUNDO JAVANICA Sparrm.

Java Swallow.

Hirundo javanica *(I)* Sparrm., Mus. Carls. 1789, II, pl. 100; *(II)* Temm., Pl. Col. 1823, pl. 83; *(2bis)* Bernst., J. f. O. 1859, 267; *(3)* Wall., Ibis 1860, 147; *(4)* id., P. Z. S. 1862, 340; *(5)* Wald., Tr. Z. S. 1872, VIII, 66; *(6)* Salvad., Cat. Ucc. Borneo 1874, 126; *(7)* Hume, Str. F. 1876, IV, 374; *(8)* Hume & Davison, ib. 1878, VI, 43; *(9)* Meyer, Ibis 1879, 128, 146; *(10)* Hume, Str. F. 1879, VIII, 47, 1880, IX, 120; *(11)* Legge, B. Ceylon 1880, 597; *(12)* Salvad., Orn. Pap. 1881, II, 3; *(13)* Davison, Str. F. 1883, X, 345; *(14)* Meyer, Isis, Dresden 1884, 6, 22; *(15)* Pleske, Bull. Ac. Petersb. 1884, 121; *(16)* Guillem., P. Z. S. 1885, 261, 419, 552; *(17)* Sharpe, Cat. B. X, 1885, 142; *(18)* Ramsay, Tab. List 1888, 2; *(19)* W. Blas., Ornis 1888, 308, 580; *(20)* Everett, J. Str. Br. R. A. S. 1889, 134; *(21)* Hartert, J. f. O. 1889,

354; *(22)* Salvad., Orn. Pap. Agg. 1890, 69; *(23)* Steere, List. Coll. B. & M. Philipp. Is. 1890, 16; *(24)* Whitehead, Ibis 1890, 49; *(25)* Sharpe, t. c. 280; *(26)* Oates, ed. Hume's Nests & Eggs Ind. B. 1890, II, 186; *(26bis)* Oates, Faun. Br. Ind. B. 1890, II, 279; *(27)* Vorderman, Nat. Tdschr. Ned. Ind. 1891, L, 451; *(28)* id., Notes Leyden Mus. 1891, 125; *(29)* Hartert, J. f. O. 1891, 294; *(30)* Salvad., Ann. Mus. Civ. Gen. 1891, (2) XII, 49; *(XXXbis)* Sharpe & Wyatt, Mon. Hirund. pt. XV, pl. (1892); *(31)* Hose, Ibis 1893, 399; *(32)* Büttik., Zool. Erg. Weber's Reise Ost-Ind. 1893, III, 277; *(33)* Sharpe, Ibis 1894, 256, 259; *(34)* Bourns & Worces., B. Menage Exp. 1894, 42; *(35)* Vorderm., N. T. Ned. Ind. 1895, LIV, 336; *(36)* Hartert, Nov. Zool. 1895, 471; *(37)* Grant, Ibis 1895, 455; *(38)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 8; *(39)* iid., ib. 1896, Nr. 1, p. 9; *(40)* iid., ib. 1896, Nr. 2, p. 14; *(41)* Hart., Nov. Zool. 1896, 595; *(42)* Büttik., Notes Leyden Mus. XVIII, 1896, 174; *(XLIII)* Meyer, Abb. Vogelskel. 1897, II, pl. CCXIII.

a. **Hirundo frontalis** *(1)* Quoy & Gaim., Voy. Astrol. Zool. 1830, I, 204, pl. 12, f. 1.

b. **Hirundo domicola** *(1)* Jerd., Madr. Journ. 1844, XIII, 173; *(2)* id., B. India 1862, I, 158.

c. **Hypurolepsis domicola** *(1)* Gld., B. Asia, I, pl. 32 (1868); *(2)* Hume, Str. F. 1874, II, 155.

d. **Hipurolepsis javanica** *(1)* Oates, B. Brit. Burmah 1883, I, 308.

"Pisok", near Manado, Manado tua, Lembeh, and Banka Islands, Nat. Coll.

"Laloa", Tonkean, E. Celebes, iid.

For further synonymy and references see Salvadori *12* and *22*; Sharpe *17*; Sharpe & Wyatt *XXX*.

Figures and descriptions. Gould *c I*; Sharpe & Wyatt *XXXbis*; Sparrm. *I*; Temminck *II* (fig. pess.); Quoy & Gaimard *a I*; Meyer *XLIII* (skel.); Legge *11*; Salvadori *12*; Sharpe *17*; Oates *d 1.*

Adult. Above black, glossed with greenish blue, wings and tail dusky; forehead, cheeks, chin, throat and upper chest hazel, darker on the forehead; under surface smoke-grey with darker shaft streaks, under wing-coverts, flanks and under tail-coverts browner, the terminal part of the last black, tipped with whitish; quills below hair-brown, the shafts pale (Macassar, ♀, Jan. 1873 — C 512). Iris brown; bill and feet black (Guillem. *16*).

Sexes. They are alike.

In some specimens the under surface is browner and darker, and the forehead and throat darker, being chestnut; this appears to be a sign of age or the breeding plumage.

Young. Like the adult, but the forehead dusky brown with paler margins to the feathers — not chestnut; head above dusky brown; chin, throat and upper chest very pale hazel; middle of abdomen whitish (N. Bohol ♀, Oct. 1877 — C 5403, Banka Id., Celebes, 12. V. 93 — C 12283).

Measurements.	Wing	Tail	Bill from nostril	Tarsus
a. (C 512) ♂ Macassar	104	48	6	10
b. (C 12282) ad. Manado tua, 9. IV. 93	103	45	6	—
c. (C 12283) juv. Banka Id.	103	44	5.5	9.5
d. (C 1854) imm. Great Sangi	106	48	5.5	—
e. (C 6818) ♂ ad. Buru, 27. III. 82 (Riedel)	106	48	6.5	—
f. (C 15696) ad. Timorlaut, May 1883	98	46	6	—
g. (C 5403) ♂ juv. Bohol, Philippines	101	41	6	—

Others from East Celebes and elsewhere do not differ in size; in two the wing is 110, 111 mm, but about 103 seems to be the average.

Egg. India: closely resembles that of *H. rustica*, but is decidedly smaller; moderately broad oval, slightly compressed towards one end, ground-colour pink-white, very finely speckled and spotted, thinly at the small, more densely at the large end, with different shades of dull purple and brownish red: 2 to 5 to a sitting: 16.3—19.6 × 12.2—14.5 mm (Hume *26*). "Examples in my collection from Celebes and Borneo resemble those of our *rustica*, are, however, smaller and measure 17.5 × 13 mm" (Nehrkorn MS.). So, also, two specimens in the Sarasin Coll. (8. Sept.).

Nest. A deep half-saucer. Of mud containing many fresh-water snail-shells, well lined with fine black hair-like vegetable fibres, a few feathers, a small piece of cotton (Kema, N. Celebes, specimen collected by Drs. Sarasin). In India various writers *(26)* mention a thick bed of feathers only as forming the lining of the nest; Mr. Theobald *(26)* speaks also of vegetable down, and Col. Legge *(11)* of "feathers, threads, small pieces of rag", and other things it may chance to pick up. Its habits of nidification, therefore, appear to differ somewhat between India and Celebes, as is not surprising in a case where migration and intermixture of individuals do not appear to be the rule.

Breeding season. North Celebes — July (Sarasin MS.); South India — 2 broods in succession from February to April (Davison *26*); April to June (Wait *26*); Ceylon — April to June (Legge *11*); Tenasserim — lays in the second week of April (Theobald *26*).

Distribution. South India and Ceylon (Legge *11*); Andamans (Hume *c 2*); Tenasserim (Davison *8*, Theobald *26*); Malay Peninsula (Hume *10*, etc.); Sumatra (Wallace *17*, Hartert *21*, Modigl. *30*); Billiton and Mendanau (Vorderman *27*, *28*); Borneo (Wallace, Mottley, etc. *20*); Palawan (Everett *20*, Whitehead *24*); Philippines — Mindoro, Samar, Negros, Basilan, Leyte, Bohol, Dinagat, Cebu, Mindanao (Steere, Platen, etc. *29*); Sooloo (Guillem. *16*); Great Sangi (Meyer *14*, Platen *19*); Lembeh, Manado tua and Banka Is. (Nat. Coll. in Dresd. Mus.); Celebes — North Peninsula (Wallace *3*, Guillem. *16*, Sarasin); E. Peninsula (N.C.); South Peninsula (Wallace *5*, Meyer *9*, Weber *32*); Togian Islands (Meyer *9*); Sula Islands (Allen *3*, *17*); Natuna Is. (Hose *36*); Java, Lombok, Timor (Salvad. *12*, Sharpe *17*); Timorlaut (Riedel, Mus. Dresd.); Ternate, Morty, Batchian, Buru, Amboina, Matabello (rect. Watubella), Kei, Salawatti, New Guinea, Jobi, Aru, Yule Id., Duke of York Id. (Salvad. *12*); Islands of Torres Straits (Sharpe *17*); Cape York, Australia (Ramsay *18*).

The Java Swallow seems to be a stationary species. Davison *(13)* speaks of it as a resident and very common about the Nilghiris, Bourdillon *(7)* as "a resident travelling but little" in the Travancore Hills. Hume believes it to be a migrant to the Andamans, but it is known in literature as a breeding species in South India, Ceylon, Tenasserim, Billiton, Borneo, Java, Celebes, Duke of York, and doubtless elsewhere. Sharpe *(17)* says that "specimens from Travancore are much duller beneath than any other birds yet examined, and those from South-eastern New Guinea and Torres Straits are palest below . . . but light-bellied examples are found in Borneo and other localities". These may be incipient subspecific distinctions, but the bird appears to be darker in

its mature dress. One from Timorlaut in the Dresden Museum is especially dark below.

H. javanica is easily distinguishable from *H. rustica* by its wanting, when adult, the long forked tail of that species, by the absence of the black pectoral collar and by the brown tint of its under surface.

The nearest relative of *H. javanica* is *H. neoxena* of Australia. This form is larger and has a longer tail. It is a migratory bird in Tasmania and New South Wales, as Gould observed (Handbook I, 108), according to whom it was also found in New Guinea by Wallace. This record is of course in the highest degree probable, though no confirmation of it has been found since.

The Java Swallow is a familiar bird in the Minahassa. In sending the above-described nest the Drs. Sarasin write: "This comes from our house at Kema, nearly every room of which was at first tenanted by a pair of Swallows. Where it could be managed we left the pretty creatures in peace, but in the library we were obliged to remove the nest. The birds, however, are hardly to be driven away; they were always making renewed attempts to take possession of the old spot. It seems, besides, that every pair claims a room or a closet for itself and will not put up with the presence of another. The song of these birds is very melodious and agreeable, albeit gentle; it calls to mind the soft babbling of a little brook".

Bernstein *(2)* and Davison *(26)* write similarly on the adhesiveness of these birds to their old nesting-spot; the latter says: — "about a week after the first brood have flown the old birds begin to remove the topmost feathers of the nest, replacing them by fresh ones. Three eggs are then again laid, and a second brood reared. After this brood have flown, the old birds still continue to occupy the nest at night, or, more correctly, to occupy the edge of the nest, for they do not get into it, but merely sit close together on its edge. The same nest is occupied the following year, the upper feathers being removed and replaced by fresh ones. Should the nest have been destroyed a fresh one is built on the same site".

The wonderful attachment of birds for house and home should always be remembered in connection with the vast return wave of migratory birds to their summer nesting-haunts, a wave which cannot be compared with one of the sea driven blindly before the wind, but a living wave wherein, we may suppose, that each of the myriad old and, perhaps, young individuals composing it, is striving towards a particular spot, hundreds or, may be, thousands of miles away. Here, as we know, they are generally to be found in due season.

In his "Neu Guinea" 1866, 162, Dr. Finsch marks *Hirundo nigricans* Vieill. as occurring in Celebes, but no confirmation of this statement has come to hand. *Petrochelidon nigricans* ranges from New Guinea and Kei to Australia, a subspecies also occurring in Timor and Flores.

FAMILY MUSCICAPIDAE.

The Flycatchers form a large family of small birds, varying in size from that of a Wren to that of a Lark, of which Sharpe as long ago as 1879 recognised 69 genera, while Newton (1893) is prepared to admit some 60. Many of these afford such near approaches to other families, viz. to the *Turdidae*, *Laniidae*, *Sylviidae* and *Campophagidae*, that their discrimination is often a matter of great difficulty, or is even impossible. They may be distinguished from the *Campophagidae* by not having a dense Cuckoo- or Pigeon-like plumage on the rump, and the nostrils not hidden, though some bristles from the forehead project over them; compared with the *Sylviidae* the Flycatchers have, as Seebohm and Oates point out, a mottled plumage when young, whereas the nestling Warbler is like its parents, but more brightly coloured; the young *Turdidae* (sometimes the adults) have a mottled or squamose plumage of the type of the young Flycatcher, but the Thrushes seek most of their food on the ground and their toes and tarsi are longer and stronger, and the nostril is exposed, not overlapped by any hairs from the forehead (Oates); the typical *Laniidae* may be recognised by their strong bills, with a hook with a notch and a "tooth" behind it, but the prominence of this character fades away in other forms, and there seems to be no perfect criterion for distinguishing them from the Flycatchers.

In the *Muscicapidae* the bill is generally broad and weak, furnished with a small notch near the tip, the gape fenced with bristles, a few projecting from the forehead over the nostrils; the first primary varies from very minute to about half the length of the wing, 3rd—5th the longest; tail of 12 feathers, rounded or square, the middle feathers sometimes lengthened; tarsus and toes rather small and weak. They feed on insects taken on the wing, and nest in holes, or form cup-shaped nests in the open.

The *Muscicapidae* are absent in the New World. The Ethiopian and Australian Regions are richest in genera, though nearly equalled by the Oriental Region, the proportions being 22, 21, 20 in the Catalogue of Birds (Sharpe, vol. IV), but a large proportion of those occurring in the Oriental Region are found in other regions also. In this family Celebes might have been expected to display strong Australian affinities; it has, however, none, since the two Australian genera, *Rhipidura* and *Gerygone*, occurring in Celebes pass on much further into the Oriental Region, and for this and other reasons their distribution can in most cases only be accounted for on the supposition of flight across sea-channels. *Monarcha* and *Myiagra* are links between Djampea, the Sangi Islands, etc. and the Australian Region, though the species, or subspecies have most likely got there by flight. *Zeocephus talautensis* has its nearest affinities in the Philippines, to which the genus was hitherto believed to be restricted. The remaining genera of Flycatchers in Celebes — not counting a migratory *Musci-*

capa — are typically Oriental, and do not occur in the Australian Region, though in some of the Lesser Sunda Islands. They are: *Siphia*, *Stoparola*, *Hypothymis*, *Muscicapula*, and *Culicicapa;* these are all absent on the eastern side of the Molucca Straits. The Long-tailed Flycatchers, *Terpsiphone*, of the Ethiopian and Indian Regions as far as the Lesser Sunda Islands, have not yet been found in Celebes.

GENUS MUSCICAPA L. after Briss.

The typical Flycatchers are small birds of plain plumage — chiefly brown above and streaked with brown below, or black and white; the wing is long, much longer than the tail, the secondaries about $^3/_5$ the wing-length, the first quill very minute, the second one long, as long or longer than the fifth; bill rather small, with scanty rictal and frontal bristles; tarsus shorter than the middle toe and claw, blackish in colour. The more typical species are Palaearctic and migratory.

+ 120. MUSCICAPA GRISEOSTICTA (Swinh.).

Chinese Flycatcher.

a. **Muscicapa hypogrammica** (Gray), *(1)* Finsch, Neu Guinea 1865, 168; *(2)* W. Blasius, J. f. O. 1883, 115.

b. **Butalis hypogrammica** *(1)* Wald., Tr. Z. S. 1872, VIII, 66.

c. **Butalis griseosticta** (Swinh.), *(1)* David & Oust., Ois. Chine 1877, 122.

Muscicapa griseosticta *(1)* Sharpe, Cat. B. IV, 1879, 153; *(2)* Salvad., Orn. Pap. 1881, II, 80; *(3)* W. Blas., P. Z. S. 1882, 706; *(5)* Pleske, Bull. Ac. Petersb. 1884, 123; *(6)* Guillem., P. Z. S. 1885, 632; *(7)* W. Blas., Ornis 1888, 311; *(8)* Everett, J. Str. Br. R. A. S. 1889, 127; *(9)* Salvad., Agg. Orn. Pap. 1890, 81; *(10)* Whitehead, Ibis 1890, 49; *(11)* Styan, Ibis 1891, 322, 349; *(12)* Hartert, J. f. O. 1891, 294; *(13)* De La Touche, Ibis 1892, 408, 424; *(14)* Bourns & Worces., B. Menage Exp. 1894, 40; *(15)* Grant, Ibis 1895, 441; *(16)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 8; *(17)* iid., ib. 1895, Nr. 9, p. 4; *(18)* iid., ib. 1896, Nr. 1, p. 9; *(19)* Hart., Nov. Zool. 1896, 156; *(20)* Grant, Ibis 1896, 540.

d. **Muscicapa manillensis** (Bp.) *(1)* Sharpe, Ibis 1888, 200.

"Monotaroda" or "Manudorio", Talaut, Nat. Coll.

"Burong pohon", Minahassa, iid.

For further synonymy and references see Sharpe *1*; Salvadori *2*.

Descriptions. Sharpe *1*; Salvadori *2*; W. Blasius *3*; David & Oust. *c 1.*

Adult male. Above grey-brown (almost hair-brown: Ridgway), the feathers of the head above with darker middles, the wing-coverts with paler edgings, the inner secondaries with whitish edgings; remiges and terminal part of tail blackish brown; under parts white, streaked with grey-brown on the breast, sides, jugulum and sides of throat; supraloral region and around the eye whitish, in front of eye duskier; under wing-coverts dark fawn: "iris dark sepia; bill black, base of under mandible yellow; legs and feet black": P. & F. S.

Measurements. Wing 83—87 mm; tail c. 50; tarsus 14; middle toe and claw c. 15.5; bill

from nostril 8 (♂, Mt. Loka, N. Celebes, c. 1400 m, 8. X. 95: Sarasin Coll.; and others).

Female. Like the male in coloration.

Young (moulting). Differs from the adult in having a few (remaining) feathers on the scapulars each with a single large white subterminal spot, some of the upper tail-coverts tipped with white, the greater wing-coverts broadly edged with white: "iris dark sepia; legs black-brown; feet below yellowish; bill black, under mandible at the base yellow" (♂, Rurukan, N. Cel., 16. X. 94: Sarasin Coll.).

Nest and eggs. Unrecorded.

Distribution. China; Formosa; Philippine Is. (Salvad. 2, Bourns & Worcester *14*, Whitehead *d 1*, *10*, Platen *7*, Everett *15*, *20*); Talaut Islands (Nat. Coll. *17*); Celebes *(a 1)*; — N. Peninsula (P. & F. Sarasin *16*, Nat. Coll., Mus. Dresd.); S. Peninsula (P. & F. Sarasin *18*, Everett *19*); Morty, Halmahera, Batchian, Tidore, Amboina, Ceram, New Guinea (Salvad. *2*); Ternate (Fischer *5*); Waigiou and Mysol (Guillem. *6*).

A migratory Flycatcher — apparently the eastern representative of the European *M. grisola* — the breeding-grounds of which seem to be North China, the winter quarters the chain of East India Islands which form a coast-line to the Pacific. Abbé David remarks that it is very abundant in summer in all China, passing Pekin twice a year — in May and June and in August and September, and, as Mr. Styan observed, it passes through the Lower Yangtse Basin in May and August. It nests, therefore, apparently north of Pekin. Its descent into its winter quarters is probably made by way of Formosa and the intermediate small islands to the Philippines. Mr. Whitehead observed it to be "a winter migrant to Palawan, arriving about the 10th September", and we find no dates to show that any remain in the East Indies in summer[1]).

For a long time its right to be included in the Celebes list rested only upon the fact that the island is marked as a locality for it in Finsch's "Neu-Guinea", 168; whence Gray's similar indication seems to be drawn (Handl. I, 321); but from general reasons it was certain to occur there. Positive evidence was furnished by the Sarasins, who got seven specimens in the hill-country of the Minahassa in September; October and November, 1894, and one from Mt. Bonthain in October, 1895; Mr. Everett also got it on the foot-hills of Mt. Bonthain in 1895 sometime after September 28th, and a specimen was killed in March, 1895, and sent from the Minahassa by our native collectors. One specimen was obtained by the same in the Talaut Islands in November, 1894, but in the autumn of 1896 it seems to have visited these islands in greater force, 14 specimens having been then shot and sent to the Dresden Museum. Some of these are now at Tring.

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[1]) Dr. Fischer's note, therefore, that it occurs all the year round on the Island of Ternate *(5)*, must be regarded as erroneous and misleading, and for similar reasons some of his observations on other species fall to the ground.

GENUS MUSCICAPULA Blyth.

These small Flycatchers differ from *Muscicapa* by their shorter, blunter wing, the second primary being shorter than the fifth, and the secondary quills relatively much longer than in that genus, being about $^4/_5$ the length of the wing; and the sexes are different in coloration. The species *M. hyperythra* stands perhaps nearer to the genus *Siphia* than it does to *M. westermanni*. The genus is Oriental.

121. MUSCICAPULA WESTERMANNI Sharpe.

Little Malay Pied Flycatcher.

Muscicapula westermanni *(1)* Sharpe, P. Z. S. 1888, 270; *(2)* id., Ibis 1888, 385; *(3)* id., Ibis 1889, 196; *(4)* Everett, J. Str. Br. R. A. S. 1889, 128; *(5)* Sharpe, Ibis 1890, 276, 286, 291; *(6)* Vorderm., N. T. Ned. Ind. LI, 1891, 389; *(7)* Grant, Ibis 1894, 506; *(8)* id., Ibis 1895, 442; *(9)* id., Ibis 1896, 464, 540; *(10)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 1, p. 9; *(11)* Hart., Nov. Zool. 1896, 156, 541, 548, 561, 569, 595; *(12)* id., ib. 1897, 158.

Descriptions. Sharpe *1* (♀); Vorderman *6* (♂).

Adult male. Upper parts, face, and ear-coverts glossy black; a broad superciliary stripe extending to the sides of the nape white; inner greater wing-coverts and a broad outer edging on the three inner remiges white; the five lateral pairs of rectrices white at their base for about $^1/_2$ their length in the outermost, increasing to about $^3/_4$ in the fifth pair, middle pair white at base only; chin, throat, and under parts white; thighs blackish; remiges below dusky, the inner edges, where they rest upon the body, whitish: "iris grey; feet blackish; bill black" — Doherty *12* (♂ ad. Erelompoa, N. W. from Loka, S. Celebes, c. 1300 m, 3. XI. 95: P. & F. Sarasin).

Female. Above dark bluish grey, with a slight tinge of brown on the head, stronger on the lower back and rump, inclining to russet on the upper tail-coverts; wings dusky with bistre-brown edgings to the feathers (paler on the greater coverts), lesser coverts bistre; tail-feathers brown, externally rufous-brown; lores and cheeks whitish, tinged with buff, on the ear-coverts passing into the grey of the upper parts; chin, throat, and under parts greyish white; thighs brown: "iris dark" (♀, Lompobatang, S. Cel., c. 2400 m, 6. XI. 95: P. & F. Sarasin).

Young (male). Remiges and tail black and white as in the adult male; remaining upper parts dull tawny, with black edges and bases to the feathers; below greyish white, the feathers of the breast and throat (faintly) barred with dusky (Bonthain Peak, S. Celebes, c. 1300 m: Sarasin Coll.).

Measurements (2 ♂♂, 1 ♀ ad. — South Cel.). Wing 54—55 mm; tail c. 40; tarsus c. 15; middle toe and claw c. 13; bill from nostril c. 7.

Nest and Eggs. "The nest was placed in a creeper in the big forest, at about 40 feet from the ground; it was quite a small pile of moss, deep, and lined with fine white roots, a very pretty bit of work, and contained one small fawn-coloured egg. They would most probably have laid two eggs, after the manner of most species in these latitudes" (Whitehead *3*).

Distribution. Tenasserim (fide Grant *7*); Perak (Wray *1*); Borneo (Whitehead *2*, *3*, *4*, *5*); Philippines — Luzon and Negros (Whitehead *7*, *8*, *9*); S. Celebes — Bonthain

Mountains (P. & F. Sarasin *10*, Everett *11*, Doherty *12*); Java (Vorderman *6*, Doherty *11*); Bali (Doherty *11*); Lombok (Doherty and Everett *11*); Sumbawa (Doherty *11*).

Since its discovery in Perak in 1888 much has been learnt about this little species, and it is now known to range from Tenasserim to the Philippines, Celebes, and Sumbawa. It seems to inhabit only the high mountain-regions. In Java Doherty got it at 9000—10000 feet; in Borneo, according to Whitehead, it ranges from 4000—9000 feet; in Celebes it has as yet been found only on the lofty Peak of Bonthain and the mountains abutting on it. It was found here by the Sarasins and by Everett at about the same time, and that it breeds here in the latter half of the year is shown by quite young specimens in both collections.

It bears, sex for sex, some resemblance to *Lalage* which may be regarded as a distant relative of very large size. From *M. hyperythra*, its fellow-inhabitant of the hills of these parts, it differs not only by its coloration, but by its smaller feet and claws, which are blackish in colour, by its smaller first primary, and flatter bill. It is closely allied to *M. melanoleuca* (Hodgs.) of the Himalayas and E. India, the female of which, according to Sharpe and Grant, is much browner above, but the males appear to be exactly similar.

† 122. MUSCICAPULA HYPERYTHRA (Blyth).

Rufous-breasted Blue Flycatcher.

Plate XIII.

a. **Dimorpha superciliaris** (nec Jerd.), *(1)* Blyth, J. A. S. B. 1842, XI, 190.

b. **Muscicapa hyperythra** *(1)* Blyth, J. A. S. B. 1842, XI, 885.

Muscicapula hyperythra *(1)* Sharpe, Cat. B. IV, 1879, 206; *(2)* id., Ibis 1888, 385; *(3)* Everett, J. Str. Br. R. A. S. 1889, 127; *(4)* Sharpe, Ibis 1890, 276, 291; *(5)* id., Ibis 1893, 551; *(6)* Hose, t. c. 396; *(7)* Grant, Ibis 1894, 505; *(8)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 9; *(9)* Hart., Nov. Zool. 1896, 156, 548, 561, 569, 595; *(10)* id., ib. 1897, 158.

c. **Cyornis hyperythrus** *(1)* Oates ed. Hume's Nests & Eggs Ind. 1890, II, 2; *(2)* id., Faun. Br. Ind. B. 1890, II, 15.

For further synonymy and references see Sharpe *1*, Oates *c 2*.

Descriptions. Sharpe *1*, Oates *c 2*.

Adult male. Above dark slaty blue; alula, remiges and tail blackish; supraloral stripe extending above the eye white; lores and base of forehead, malar region, angle of chin, and ear-coverts blackish, washed with slaty blue; throat and breast orange-rufous, paling into whitish on abdomen and under tail-coverts; thighs olive, washed with slaty blue; sides washed with olive and rufous; under wing-coverts whitish, edge of wing slaty blue (♂ ad., Masarang hills, N. Cel., 16. VII. 94: Sarasin Coll.).

"Legs and feet very pale silvery to fleshy pink, the terminal joints of the toes and the claws slightly brownish; bill black; iris deep brown" — Hume.

Male, scarcely adult. Like the adult male, but somewhat greyer above; the wings in changing plumage, for the most part resembling those of the female; the abdomen less clear whitish (Lompobatang, S. Cel. c. 2500 m; Oct. 1895: Sarasin Coll.).

Female. Above olive, tinged with grey, tail and wings externally bistre-brown; lores, base of forehead, around the eye, and throat isabelline, inclining to orange-rufous on the breast and under wing-coverts; abdomen whitish, olivaceous on the sides, flanks, and thighs: "bill black; iris dark brown; legs and feet reddish grey" (♀, summit-region of Mt. Klabat, N. Cel., end Sept. 1893: Sarasin Coll.).

Young. Above warm dark brown, blackish on head, the feathers everywhere with broad mesial streaks of tawny; wings and tail blackish brown with warm brown edgings; below tawny, whitish on throat and abdomen and under tail-coverts, the feathers on sides of throat, breast, sides and flanks margined with dusky: "bill above black-brown, tip yellow, below yellow and brown; iris dark brown; legs reddish yellow; feet yellow" (♂, summit-region of Mt. Klabat, 25. Sept. 1893: Sarasin Coll.).

Measurements.	Wing	Tail	Tarsus	Bill fr. nostr.
a. (Sarasin Coll.) ♂ ad. Mt. Masarang, N. Cel., 16. VII. 94	60	40	19	7
b. (Saras. C.) ♂ ad. Mt. Lokon, N. Cel., c. 1200 m, 1. VII. 94	60	38	18.5	—
c. (Sarasin Coll.) ♀, Mt. Klabat, end Sept. 93. . . .	57	34	18	6
d. (Sar. C.) ♂ vix ad. Lompobatang, S. Cel. c. 2500 m, Oct. 95	66	45	20	7

The female is evidently smaller than the male. The specimen from S. Celebes is very large. Oates' measurements of Indian specimens are equal to those of N. Celebes.

Nest and eggs. Nest a deep cup of moss and moss-roots, placed under the roots, etc. of a tree: eggs 4 or 3, pale greyish or brownish white, finely freckled and mottled, chiefly at the large end, with dingy brownish red: 17.3 × 11.2 mm (Hodgson *c 1*).

Distribution. India (Oates etc. *c 2*); Malay Peninsula (fide Sharpe *1*); Sumatra (Wallace *1*); Borneo (Whitehead *2, 3*, Hose *6*); W. Java (Wallace *1*); Bali (Doherty *9*); Lombok (Doherty and Everett *9*); Sumbawa (Doherty *9*); Celebes — North (P. & F. Sarasin *8*), South (Everett *9*, P. & F. S., Doherty *10*).

This little Flycatcher is very like a *Siphia*, sex for sex. The white supra-loral stripe of the male is its most striking distinguishing character: it is much smaller than *Siphia* and has also a smaller bill. The credit of its discovery in Celebes belongs to the Sarasins, who got it at high elevations in the Minahassa in 1893—94. It was also found by Everett and Doherty and — in one young specimen — by the Sarasins on the lofty Bonthain Range in the south of the island. In India, Borneo, Bali, Lombok, and Sumbawa, it is known only from the mountains, or from mountainous countries; and it is evident that it is purely a hill-species. It is probably most nearly allied to *M. hodgsoni* (Verr.) of Indo-China, the male of which wants the white eyebrow.

GENUS SIPHIA Hdgs.

The Celebesian species of this genus are, when adult, blue or olive above, and chiefly orange-rufous below; some forms from other parts have the rufous confined to the region of the throat. The wing is longer than the tail, the

secondaries about $^4/_5$ as long as the primaries, the second primary hardly exceeding them; the rictal bristles are well developed, reaching to within the terminal third of the culmen, the bill from the nostril about half as long as the tarsus, the tarsus about as long as the middle toe and claw. The sexes generally differ somewhat in coloration; the young are mottled. The genus ranges (cf. Sharpe) from India to Timor and the Philippines.

† 123. SIPHIA BANYUMAS (Horsf.).

Blue-and-rufous Flycatcher.

Plate XIV.

It has been shown by Mr. Hartert *(f 1)* that this form differs racially in Borneo and in Celebes, the females in the former country having white lores and the males showing some less striking divergences from Celebes birds. Hartert identifies the Borneo birds with those of Java; unfortunately the female of the latter seems never to have been described, and it is not yet certain that the Celebes birds are distinct from, and those of Borneo identical with, those of Java. Probably neither are quite the same as the latter, but, until this is known to be the case, it may be preferable not to commence to break up the species.

a. **Muscicapa banyumas** *(1)* Horsf., Tr. L. S. 1821, XIII, 146; *(II)* id., Zool. Researches in Java 1824, pl. 38.

b. **Muscicapa cantatrix** *(I)* Temm., Pl. Col. 1823, pl. 226 (♂ only, fide Sharpe).

c. **Niltava banyumas** *(1)* Gray, Gen. B. 1846, I, 264; *(2)* Brügg., Abh. Ver. Bremen 1876, V, 68.

d. **Cyornis banyumas** *(1)* Bernst., J. f. O. 1859, 265 (Nat. Tdschr. Ned. Ind. 1860, XXII, 19); *(2)* Wald., Tr. Z. S. 1872, VIII, 117 (?pt. not Borneo); *(3)* Salvad., Cat. Ucc. Borneo 1874, 130 (?pt.); *(4)* W. Blas., J. f. O. 1883, 137; *(5)* Vorderman, Nat. Tdschr. Ned. Ind. 1886, XLV, 362; *(6)* Tristr., Cat. Coll. B. 1889, 202 (?pt.).

Siphia banyumas *(1)* Sharpe, Cat. B. IV, 1879, 449 (?pt.); *(2)* Nicholson, Ibis 1882, 68; ?*(3)* Everett, P. Z. S. 1889, 226; ?*(4)* id., J. Str. Br. R. A. S. 1889, 132; ?*(5)* Sharpe, Ibis 1890, 276; *(6)* Hartert, Kat. Senckenb. Mus. 1891, 96 (?pt.); *(6^{bis})* id., Ornis 1891, 120; ?*(7)* Hose, Ibis 1893, 398; *(8)* Büttik., Zool. Erg. Weber's Reise in Ost-Ind. 1893, III, 277, 286; *(9)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 9; *(10)* iid., ib. 1896, Nr. 1, pp. 5, 9.

e. **Siphia rufigula** (err.), *(1)* Meyer, Ibis 1879, 128.

f. **Siphia omissa** *(1)* Hartert, Nov. Zool. 1896, 71, 157, 171, 172; *(2)* id., ib. 1897, 158.

"Siongsiong", near Tondano, Nat. Coll.

For further synonymy and references compare Hartert *f 1*, and see Salvadori *d 3*; Sharpe *1*.

Figures and descriptions. Horsfield *a II*; Temminck *b I*; Sharpe *1*; Vorderman *d 5*.

Adult male. Above, including tail and exposed edges of quills, China-blue on a dark ground, duskier on the crown; forehead, superciliary region, and lesser wing-coverts much brighter blue; lores, chin, malar region, sides of throat, and ear-coverts slaty black, washed with blue posteriorly; throat and under surface dark orange-rufous, paler on under wing-coverts and middle of abdomen; wings and tail below shining dusky, paler on the inner webs of the quills, washed with buff on the inner-

most ones (♂, Tomohon, N. Cel. 6. IV. 94, Sarasin Coll.). "Iris grey-brown; bill black; feet violet-grey" (Platen in Mus. Nehrkorn, Rurukan, ♀, 21. IV. 85).

Adult female. Above and below much as in the male, but the blue above duller, with a wash of olive on the head and neck; differs chiefly by not having the lores, orbital region, chin, and submalar region black or blue-black, but orange-rufous, like the under parts, only paler; ear-coverts olive-brown, with pale shafts, slightly washed with blue posteriorly (♀, Loka, S. Cel., 11. X. 95: Sarasin Coll.).

The colour of the lores is whiter (i. e. very little tinged with rufous) in some specimens than in others, it generally extends narrowly across where forehead and bill meet, but not so in one example (or two) of those consulted for this article.

Young. Above dark brown, each feather with a spot of tawny-cinnamon, narrowly bordered with black; on the head these spots take a more striate character; the rufous feathers of the under-surface fringed with black, giving a streaked appearance (Tondano, Aug.—Sept. 1892 — Nat. Coll.: C 10812).

Measurements.	Wing	Tail	Tarsus	Bill from nostr.
a. (Sarasin Coll.) ♂ ad., Tomohon, N. Cel., 6. IV. 94 .	74	54	19.5	9
b. (Sarasin Coll.) ♂ ad., Lake Posso, Centr.Cel., 12. II. 95	74	55	17.5	9.5
c. (Sarasin Coll.) ♂ ad., Loka, S. Cel., 6. X. 95 . . .	78	62	19	11
d. (C 10808) [♂] ad., Tondano, N. Cel., VIII.—IX. 92 .	75	56	17.5	9
e. (C 10809) [♂] ad., Tondano, N. Cel., VIII.—IX. 92 .	75	57	—	9.5
f. (Sarasin Coll.) ♀, Tomohon, N. Cel., 6. IV. 94 . .	73	53	19	9.5
g. (Sarasin Coll.) ♀, Tomohon, N. Cel., 21. XI. 94. .	72	55	18	9
h. (Sarasin Coll.) ♀, Rurukan, N. Cel., 24. XI. 94 . .	73	55	18.5	10
i. (Sarasin Coll.) ♀, Loka, S. Cel., 11. X. 95	72	55	18	9.5
j. (C 10811) [♀], Tondano, N. Cel., VIII.—IX. 92 . .	73	—	—	9.5
k. (C 10810) [♀], Tondano, N. Cel., VIII.—IX. 92 . .	74	55	—	10
l. (C 14916) ♂ ad., Saleyer, Nov. 95 (Everett). . . .	74	57	19.5	9.5
m. (C 11065) [♂] ad., Java (v. Schierbrand)	76	63	18	—
n. (C 11066) [♂] ad., Java (v. Schierbrand)	77	61	18	10

Observation. Lord Walden's statement that Celebes examples are undistinguishable from those of Java is confirmed by the above series, so far at least as the males are concerned, except that the Javan birds seem to have less black on the chin and sides of the throat. They are not darker (but, if anything, paler) blue above, they do not show a tiny white spot on the throat, nor is there a different distribution of the colour on the throat — differences observed by Mr. Hartert in the *Siphia* from Borneo. The female of *S. banyumas* is stated by Sharpe and Hartert to have white lores, but this statement relates to the female from Borneo, and we are not aware that this is the case in the typical form from Java. The male *l* from Saleyer is paler below than those of the mainland; black of chin narrow.

Eggs. Java: 2 in number; dirty white, sometimes partaking of a yellowish, sometimes of a greenish tint, slightly glossy; sprinkled with dirty red spots which blend to some extent with the ground-colour, most plentiful at the large end which appears in consequence as if marbled with rusty; size 21 × 15 mm (Bernstein *c 1*).

Nest. Composed chiefly of the horse-hair-like threads of the Areng palm, some few roots, a little moss, bits of leaf; well built, in shape a half-sphere. Twice found among the ferns and other parasites on the stem of an Areng palm, once in the crevice formed by the boughs of a very mossy tree (Bernstein *c 1*).

Distribution. Java (Horsfield *a 1*, Bernstein *d 1*, etc.); Saleyer (Weber *8*, Everett *f 1*); Celebes: — South Peninsula (Weber *8*, P. & F. Sarasin *10*, Everett *f 1*), Central Celebes (P. & F. S. *10*), W. Celebes (Doherty *f 2*), N. Peninsula (Meyer *d 2*, Fischer *c 2*, etc.); ?Palawan (Everett *3*, *4*); ?Borneo (Doria & Beccari, etc. *d 3*, *4*); ?Labuan (Low *4*); ?Sumatra (Raffles *d 3*); ?Penang (Wallace *1*).

This Blue-backed Flycatcher appears to be a species which has recently extended its range, and in Celebes it may probably be regarded as a slightly modified colonist from Java.

It is related to *S. philippinensis* Sharpe of the Philippine Islands, a species which Lord Tweeddale, while noticing certain differences, did not venture to separate. In this form, as Dr. Sharpe shows (Tr. Linn. Soc. 1889, I, 324), the abdomen and under tail-coverts are white, instead of orange-rufous. In the allied *S. djampeana* the sexes are said by Mr. Hartert to be much alike and the ♀ hardly to differ from the ♂ of the Celebes birds except by the slightly larger bill and darker, almost entirely black, ear-coverts and malar region. *Siphia rufigula* (Wall.) of Celebes is also somewhat similar, but may easily be distinguished by its white abdomen and under tail-coverts and the absence of black on its chin. In some of his excellent field-notes on Javan birds Bernstein *(d 1)* writes as follows on the habits of *Siphia banyumas:* "It inhabits by preference the groves and shrubs around villages at some elevation not far from the hill-forests, as also the coffee plantations and the forests themselves, though it is seen far less plentifully in their depths than along their borders. On the plains on the contrary it belongs to the birds of rarer occurrence. Sitting upon a prominent bough it watches attentively for insects, which it catches very cleverly on the wing, and then, turning back to the perch it had left or to another bough, devours them. Its song is rather simple, and when Temminck *(b I)* describes it as excellent he is not well informed". In Celebes it also seems to be a hill species; Platen sent it to Mr. Nehrkorn from Rurukan, 3000 feet; the Sarasins got it in the same neighbourhood, also at Lake Posso; they, Weber and Everett about Mt. Bonthain, Doherty at 4000 and 6000 ft. in W. Celebes. Our native collectors recently obtained a number of specimens near Tondano, 2000 ft. No specimens have as yet been recorded from the low-lands of the island. Hose obtained the Bornean race only at a height of 2000 feet on Mount Dulit, whereas *Siphia nigrogularis* "is the usual low-country form of Blue Flycatcher" in Borneo. *Siphia rufigula* of Celebes has, on the other hand, apparently been obtained only in the low country of Celebes.

The curious mottled plumage of the young corresponds with that of the young *Muscicapa grisola* of Europe. From this type the adult *Muscicapa* has departed less widely than the adult *Siphia*.

♀* 124. SIPHIA DJAMPEANA Hart.

Djampea Blue-and-rufous Flycatcher.

Plate XIV.

Siphia djampeana Hartert, Nov. Zool. 1896, 172.

Male. Differs from *S. banyumas* from Java, Celebes and Saleyer by having the upper throat white where it meets the black of the chin and submalar region, the black here almost untinged with blue and broader than in *S. banyumas* (♂ ad. Djampea, Dec. 1895: Everett, C. 14868).

Female. Like the male, but the white on the throat almost completely absent (♀ vix ad. Djampea, Dec. 95: Everett, C 14869).

Measurements. Wing 78—81 mm; tail 67—69; tarsus 18—19; culmen 17 (Hartert).

Distribution. Djampea Island between Celebes and Flores (Everett).

This is one of the numerous additions made by Mr. Everett to the avifauna of the Celebesian Province in the latter months of 1895. A good series of specimens was obtained. The most curious point about the bird seems to be that the female is much like the male, or still more like the male of *Siphia banyumas*, from which it is not easily distinguished. The female of *S. banyumas* is a simpler bird. Altogether *S. djampeana* seems to present a more advanced stage of evolution.

♀ * 125. SIPHIA KALAOENSIS Hart.

Kalao Blue-and-rufous Flycatcher.

Plate XIV.

Siphia kalaoensis Hartert, Nov. Zool. 1896, 172.

Male. Above like *S. djampeana* and *banyumas*, from which it differs by having the breast and middle of the throat white. The abdomen is pale orange-rufous, whiter on the under tail-coverts. The black on the chin and sides of throat broad, and slightly tinged with blue (♂, Kalao, Dec. 1895: Everett, C 14899).

Female. "Like the male, except that the breast is strongly washed with orange-rufous and that the under tail-coverts are coloured like the abdomen. The female is, therefore, practically indistinguishable from the male of *S. djampeana*, but the breast is paler" (Hartert).

Measurements. Wing 76—78 mm; tail 65—68; tarsus 19—20; culmen 16—17. The female is a little smaller, wing 72 mm (Hartert). Mr. Hartert evidently measures the tail from its extreme base; we take it from the oil-gland, which gives a result of about 8 mm less for this species.

Distribution. Kalao Island between Celebes and Flores (Everett).

This is an interesting species. Mr. Hartert draws attention to the increase in white on the under parts of the Flycatchers from Celebes and Saleyer as they range to Djampea and Kalao. It is greatest in the male of Kalao, the female of the Kalao race is like the male of the Djampea race, the female of the

Djampea race like the male of that of Saleyer and the mainland of Celebes. The females of these birds seem to show a lower organisation in this genus, the males a more advanced stage; if this be so, *S. banyumas* is obviously indicated as the ancestral form of *S. djampeana* and the latter of *kalaoensis*. See, pp. 160—169, *Loriculus*.

† *126. SIPHIA RUFIGULA (Wall.).

Lowland Blue-and-rufous Flycatcher.

a. **Cyornis rufigula** *(1)* Wall., P. Z. S. 1865, 476; *(II)* Wald., Tr. Z. S. 1872, VIII, 66, pl. VII, fig. 3.

Siphia rufigula *(1)* Blyth, Ibis 1866, 372; *(2)* Sharpe, Cat. B. IV, 1879, 454; *(3)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 1, p. 9; *(4)* Hart., Nov. Zool. 1897, 159.

b. **Niltava rufigula** *(1)* Gray, HL. 1869, I, 326, Nr. 4887; *(2)* Rosenb., Malay. Archip. 1878, 273.

Figure and descriptions. Walden *a II*; Wallace *a 1*; Sharpe *2*.

Adult male. Dark ashy blue; throat and breast bright rufous, becoming pale on the belly and pure white on the under tail-coverts; front of the eye and ear-coverts blackish; under wing-coverts rufescent white; quills and tail-feathers dusky, ashy-margined; iris dark; bill black; feet nearly white (Wall. *a 1*).

Total length 132 mm; wing 69; tail 57; tarsus 16.5; culmen 11.1 (Sh. *2*).

Female. Very different from the male: brown above, and without the black face. Upper parts grey-olive, greyest on head, brightening into brownish chestnut on the upper tail-coverts and outer edges of the rectrices; wing-coverts and quills dusky with warmer brown tips and edges; lores, orbital region, chin, throat, and breast orange-rufous, paler on chin and throat; cheeks and ear-coverts darker, passing posteriorly into the grey-olive of the nape; abdomen and under tail-coverts white; sides and thighs olivaceous; under wing-coverts brown-buff: bill dark brown; legs, feet, and claws yellowish in the skin. Wing 60 mm; tail 40; tarsus 17; bill from nostril 8 (♀, Mapane, Centr. Cel. 28. II. 95: Sarasin Coll.).

Mr. Hartert was so good as to compare this specimen with those at Tring and to confirm its identity.

Distribution. Celebes: Minahassa — Manado (Wallace *a 1, 2*); Mapane, southern shore of the Gulf of Tomini (P. & F. Sarasin *3*); Macassar (Doherty *4*).

For thirty years a single male specimen of this species in the British Museum was the only one definitely known, then a female was obtained in Central Celebes by the cousins Sarasin, and latterly a male and a female in the Southern Peninsula by Doherty. About the same time a pair and a male of a bird much resembling the female of *S. rufigula* were sent by Everett and Doherty from the Peak of Bonthain to the Tring Museum, and Mr. Hartert soon became aware that he had to do with a lowland and a mountain species. The differences of *S. bonthaina* from the female of *S. rufigula* are recapitulated from Hartert's notes in the next article; the male of *S. rufigula* looks quite different by reason of its blackish lores and ear-coverts and dark ashy blue upper parts.

It appears to be nearly related to *S. philippinensis* Sh., a considerably larger form: wing 79 as against 69 mm (Sharpe). *S. banyumas* of Celebes may be distinguished by its entire under surface of orange-rufous and by its black chin and sides of throat.

Among the *Muscicapidae* there is no species connecting the Australian Region with Celebes, since Australian forms which reach Celebes pass on into the other Great Sunda Islands, the Philippines, or further. This is of interest from the fact that the Australian Region rivals Africa in the question as to which area possesses the greater number of peculiar *Muscicapidine* genera. Celebes viewed as Australasian ground might be expected to have a share of the peculiar Australian Flycatchers. On the other hand several Oriental genera connect Celebes with the countries to the west, without passing into the Moluccas on the east. *Siphia* is one of these, its range being from the Himalayas and East China to Celebes, Java, and Timor.

♂* 127. SIPHIA BONTHAINA Hart.

Mountain Flycatcher.

Siphia bonthaina *(1)* Hart., Nov. Zool. 1896, 157; *(2)* id., ib. 1897, 158.

Male. "Above olive, quills margined with rufous-brown on the outer webs and with light brown on the inner webs. Tail deep chestnut, more brownish on the tip; upper tail-coverts of the same colour. A large spot over the lores; from the base of the bill to the middle of the eye pale ochraceous. Chin, throat, and breast light ochraceous. Abdomen white, bases of feathers slate-colour. Under tail-coverts white with an ochraceous shade; under wing-coverts very pale brownish. L. t. about 110 mm; wing 65; tail 47" (Hartert *1*).

"Iris deep chestnut; feet slaty grey, soles pale reddish; bill black" (Doherty *2*).

Female. "Has the wing only 61 mm, the tail 45 mm, and the chin, throat, and breast are very much paler than in the male" (Hartert *1*).

Distribution. Mountains of Celebes: Bonthain, c. 6000 ft. (Everett, Doherty).

At the time of writing, the only specimens of this species known are three — two males and a female in the Tring Museum. They bear much resemblance to the female of the lowland *S. rufigula*, and may probably be regarded as representing a lowly organised species in respect of coloration. Mr. Hartert, who has carefully established the validity of this form, writes in lit.: "The upper side of *S. bonthaina* is olive (without any greyish tint in it), while it is olive-grey in the female of *rufigula*. The tail of *S. bonthaina* is chestnut throughout, while it is deep brown with chestnut outer margins in *S. rufigula* ♀". He adds *(2)*: "The wing of *S. rufigula* is decidedly shorter, measuring only 57 mm[1]). The tarsus of *S. rufigula* is much shorter 16 mm (19 to 20 in *S. bonthaina*).

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[1]) In the Sarasins' example 60 mm.

GENUS STOPAROLA Blyth.

These Flycatchers are distinguishable by their grey-blue or verditer coloration, the males differing from the females by their black lores. The wing formula is very like that of *Siphia*, from which it differs chiefly by the bill, which is shorter, though equally broad at the base, and the tarsus is also relatively a little shorter. The plumage of the rump and flanks seems to be of a softer and thicker character. The male has a sweet song (Legge, Sarasins). The genus is found from Afghanistan to the Philippines, Celebes, and Java.

+ * 128. STOPAROLA SEPTENTRIONALIS Bütt.

North Celebesian Blue Flycatcher.

Plate XV.

Stoparola septentrionalis *(1)* Büttik., Notes Leyd. Mus. 1893, 169; *(2)* M. & Wg., Abh. Mus. Dresden 1895, Nr. 8, p. 9; *(3)* iid., ib. 1896, Nr. 1, p. 5.

Description. Büttikofer *1.*

Male. Verditer-blue, paling into whitish on the abdomen and white on the under tail-coverts. Forehead and superciliary stripe, and upper throat bright pale blue; lores jet-black; angle of chin at the gonys blackish; remiges and tail dusky, washed externally with the verditer-blue of the back; wing and tail below dusky, the under wing-coverts (except the outer ones) and the inner edges of the remiges white: bill black, legs and feet dark in skin (♂, Mt. Lokon, N. Cel., 1. VII. 94: Sarasin Coll.).

Female. Like the male, but without the black lores (though the feathers here have black bases), the bright superciliary stripe hardly at all pronounced, and there is less bright light blue on the forehead and upper throat; the blue on the upper surface, throat, and breast a shade darker and duller (♀, Tomohon, 4. VI. 94: Sarasin Coll.).

Nestling. Remiges and rectrices (half-grown) as in the adult; head and neck blackish, each feather with a tawny subterminal spot; remaining upper parts dull bluish grey with duller tawny spots; under parts whitish washed with tawny, brighter tawny on breast, all the feathers with U-shaped margins of blackish: bill yellowish, browner above (♂ ?, Tomohon, 13. XI. 94: Sarasin Coll.).

Measurements.

	Wing	Tail	Tarsus	Bill from nostril
a. (Sarasin Coll.) ♂ ad. Tomohon, 3. V. 94	70	53	16	8
b. (C 13898) ♂ ad. Tomohon, 6. V. 94 (P. & F. S.) . .	71	51	16	8
c. (Sarasin Coll.) ♂ ad. Mt. Lokon, 1. VII. 94 . . .	74	55	16	—
d. (Sarasin Coll.) ♂ ad. Mt. Masarang, 25. IV. 94 . .	73	54	—	7.5
e. (Sarasin Coll.) ♀ Tomohon, 8. IV. 94	71	52	15.5	8
f. (Sarasin Coll.) ♀ Tomohon, 4. VI. 94	70	50	—	7.5
g. (Sarasin Coll.) ♀ Tomohon, 18. X. 94	69	48	—	7.5

Nest. Of small roots, moss, and fibres, lined with hair-like vegetable fibres; stated by the finder to have been situated in grass: in shape a flat hemisphere, the cup 45 mm diam. by 35 deep, the walls about 35 thick (see plate: Tomohon, 8. June 1894: Sarasin Coll.).

Distribution. North Celebes — Minahassa, Tondano (von Rosenberg *1*), Manado District (v. Duivenbode *1*), Tomohon, Mt. Masarang and Mt. Lokon (P. & F. Sarasin).

Mr. Büttikofer remarks that as to colour this species may be best compared with *S. melanops* (Vig.) of India, from which it differs in having the inner web of the tail-feathers black instead of blue, and in its size being much smaller. A note of von Rosenberg's says it is "frequently seen in brushwood and low trees, living upon insects".

With this species and the next was made the interesting addition of another Oriental Flycatcher-genus to the avifauna of Celebes, a *Muscicapidine* form not known in the Australian Region. The genus ranges from the Himalayas as far as Afghanistan, east to South China, the Philippines, Celebes, and Java.

The Sarasins have added much to what is known of this species. They obtained a nice series of specimens, with the sex properly ascertained, showing the difference between the male and the female; also a nest containing the two nestlings shown in the plate. Like its near relation, *S. meridionalis* Büttik., of South Celebes, it appears to be an inhabitant of the hill-country.

+ * 129. STOPAROLA MERIDIONALIS Bütt.

South Celebesian Blue Flycatcher.

Stoparola meridionalis *(1)* Büttik., Notes Leyden Mus. 1893, XV, 170; *(2)* id., Zool. Erg. Weber's Reise in Ost-Ind. 1893, III, 278; *(3)* Hart., Nov. Zool. 1896, 158; *(4)* id., ib. 1897, 158.

Male. Similar to *S. septentrionalis*, but larger, of a darker and duller blue, especially on the throat and breast; the bright light blue on the forehead, superciliary region and upper throat less extensive: "iris deep chestnut; feet black; beak black" (Doherty *4*); (♂, c. 6000 ft. on Lompobatang, S. Cel., 14. X. 95, Sarasin Coll.).

Female. Similar to the male, but the lores not black, being blackish with blue tips to the feathers; size a little smaller (♀, Bonthain Peak, 6000 ft., Oct. 95: Everett — C 14887).

Young. Above tawny, with black edges to the feathers and blackish bases; wings and tail blackish washed with verditer-blue, as in the adult, wing-coverts tipped with tawny; under parts tawny on breast, paler on throat and abdomen, with marginal U-shaped bars of blackish, almost completely absent on under tail-coverts; under wing-coverts buff-white (♂ juv., 1200 m, near Loka, S. Cel., 13. X. 95; Sarasin Coll.).

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (Sarasin Coll.) ♂, Lompobatang, 14. X. 95 . . .	79	66	17	8
b. (Sarasin Coll.) ♂, Loka, 11. X. 95	81	60	17	8
c. (C 14886) ♂, Bonthain Peak, X. 95 (Everett) . . .	81	62	17	—
d. (C 14887) ♀, Bonthain Peak, X. 95 (Everett) . . .	76	55	17	8
e. (Sarasin Coll.) ♂ juv. near Loka, 13. X. 95 . . .	77	56	—	7

Distribution. South Celebes: Macassar District (Teijsmann *1*); Mt. Bonthain and its neighbourhood (Weber *2*, Everett *3*, P. & F. Sarasin, Doherty *4*).

This species is as yet definitely known only from high elevations, 4000 to 10000 feet, on the Bonthain mass of mountains. The Drs. Sarasin write:

"We heard the bird singing on the topmost point of Lompobatang, on the tallest tree in South Celebes. The song is very melodious". It and *S. septentrionalis* are evidently only geographical races.

GENUS HYPOTHYMIS Boie.

The Blue Flycatchers may be distinguished from all the foregoing by their having the tail as long as the wings; the wing is more rounded, the second primary shorter than the secondaries, which are about $^7/_8$ the length of the wing, the 4th, 5th and 6th primaries the longest. The bill is moderately large, the culmen from the frontal suture almost as long as the cranium; the rictal bristles large and strong, the longest reaching nearly as far as the tip of the bill. The genus is found from the Himalayas as far as the Philippines, Celebes, Sula, and the Lesser Sunda Islands.

+ * 130. HYPOTHYMIS PUELLA (Wall.).

Long-tailed Blue Flycatcher.

a. **Muscicapa coerulea** *(1)* S. Müll. (nec Gm.), Verh. Natuurk. Comm. 1839—43, 91; *(2)* id., Reiz. Ind. Archip. 1858, II, 15.

b. **Myiagra puella** *(1)* Wall., P. Z. S. 1862, 340 (ex Gray MS.); *(2)* Gray, HL. 1872, I, 328, Nrs. 4931, 4932; *(3)* Brügg., Abh. Ver. Bremen 1876, V, 68; *(4)* Rosenb., Malay. Archip. 1878, 273.

Hypothymis puella *(1)* Wald., Tr. Z. S. 1872, VIII, 66, pl. VII, fig. 2; *(2)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 656; *(3)* Lenz, J. f. O. 1877, 373; *(4)* Sharpe, Cat. B. IV, 1879, 277; *(5)* Meyer, Ibis 1879, 128, 146; *(6)* W. Blas., J. f. O. 1883, 117, 137; *(7)* Meyer, Isis, Dresden 1884, 25; *(8)* Blas., Ztschr. ges. Orn. 1885, 278; 1886, 112; *(9)* Guillem., P. Z. S. 1885, 553; *(10)* Tristr., Cat. Coll. B. 1889, 197 (Sula Is.); *(11)* Heine & Rchnw., Nomencl. Mus. Hein. 1890, 35; *(12)* Büttik., Zool. Erg. Weber's Reise Ost-Ind. 1893, III, 278; *(XII^{bis})* Meyer, Vogelskel., I, 1894, t. CCIII; *(13)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 9; *(14)* iid., ib. 1896, Nr. 1, p. 9; *(15)* iid., ib. 1896, Nr. 2, p. 14; *(16)* Hart., Nov. Zool. 1896, 157; *(17)* id., ib. 1897, 157, 162.

c. **Myiagra azurea** *(1)* Pelz. (nec Bodd.), Verh. z.-b. Ges. Wien 1873, April (fide Blas. *6*).

"Rui" (Meyer *5*) or **"Ruirui"** (Nat. Coll.), Minahassa — a name taken from its call-note.

"Ting-kuikui", Tonkean, E. Celebes (N. C.).

"Tangkui", Banggai (N. C.).

Figures and descriptions. Walden *I*; Meyer *XII^{bis}* (skeleton); Wallace *b 1*; Brüggemann *b 3*; Sharpe *4*.

Adult male. Campanula-blue; brightest on the head, lores, chin and lesser wing-coverts, duller and greyer on lower back and breast, passing almost into olive-grey on the abdomen, flanks and under tail-coverts; exposed webs of wings and tail blue like the back, below dusky olive-grey; on forehead and chin at base of bill a narrow edge of black; under wing-coverts whitish (Kema, ♂, Febr. 1873: C 743, Meyer).

Iris blue (Meyer *5*, Platen *8*) — eyelids blue, iris dark (Wall. *b 1*) — iris brown (Guillem. *9* — the differences in the statements of the collectors may be of a

sexual nature); feet blue, like the belly; claws black; bill blue, like the head; even the bones are blue (M. *5*).

Female. Like the male, but somewhat greyer and duller (Manado — C 755).

Nestling. Grey; belly and breast white, head grey (Meyer *5*).

Measurements (23 specimens — Manado, Togian Is., Banka, Manado tua, Mantehage). Wing 67—77 (Manado, C 742 and C 744); tail 74—84: tarsus 16—16.5; bill from nostril 8.7—9.5. Average length of wing 72—73 mm.

Skeleton.

Length of cranium	35.0 mm	Length of tarso-metatarsus	17.5 mm
Greatest breadth of cranium	15.0 »	Length of digitus I	12.0 »
Length of humerus	18.0 »	Length of digitus II	10.0 »
Length of ulna	22.0 »	Length of digitus III	15.0 »
Length of radius	20.0 »	Length of digitus IV	12.0 »
Length of manus	18.0 »	Length of sternum	19.0 »
Length of metacarpus	10.0 »	Greatest breadth of sternum	12.5 »
Length of digitus I	3.0 »	Height of crista sterni	6.4 »
Length of digitus II	8.5 »	Length of coracoideum	16.0 »
Length of digitus III	2.5 »	Length of scapula	20.0 »
Length of femur	15.5 »	Length of clavicula	15.0 »
Length of tibia	24.0 »	Length of pelvis	12.0 »
Length of fibula	9.0 »	Greatest breadth of pelvis	15.0 »

Eggs. Unrecorded.

Nest. Cup-shaped, the size of a Chaffinch's, rather loosely built of moss and coarse straw-like strips of dead grasses or wood, ornamented externally with a few large seeds, lined with fine root-fibres. Placed on the twigs of a tree. Height 50, breadth 65, breadth of pocket 52, depth of pocket 38 mm (Manado, Nr. 83: Meyer).

Breeding season. This nest was taken in March, 1871, and contained two nestlings. The number of eggs is, therefore, probably only two, which were laid in this case in February.

Distribution. Celebes: — Minahassa (Wall. *4*, M. *5*, etc.); Manado tua, Mantehage, Lembeh, Banka off the Minahassa (Nat. Coll. in Dresd. Mus.); Hill-forests between the Minahassa and Mongondo (P. & F. Sarasin); Gorontalo Distr. (Meyer *5*); Togian Islands (Meyer *5*); Kandari, S. E. Celebes (Beccari *2*); W. Celebes (Doherty *17*); Centr. Celebes, Mapane (P. & F. S. *14*); E. Celebes (N. C.); small island off Buton Id. (S. Müller *a 1*); S. Peninsula (Wallace *4*, Platen *8*, etc.); Palopo at head of Gulf of Boni (Weber *12*); Peling and Banggai Id. (N. C.); Sula Islands (Allen *b 1*, *4*, *11*).

The common Blue Flycatcher of Celebes and Sula is a very distinct form most nearly allied to *H. rowleyi* (Meyer) of Great Sangi. *H. rowleyi* differs in having the upper parts much darker blue and the under surface uniform bluish cinereous, and in its much larger size. *H. occipitalis* (Vig.), the range of which is given by Sharpe (Cat. B. IV, 276; Ibis 1890, 276) as from Tenasserim to Flores, Borneo, and the Philippines, is easily distinguishable by its black pectoral collar and black nuchal patch; this form appears to be only subspecifically distinct from *H. azurea* (Bodd.) of Burmah and India. From its well marked differences *H. puella* might be regarded as a rather ancient inhabitant of Celebes.

The genus *Hypothymis* forms another connecting-band between Celebes and the Oriental Region, no Flycatcher of this genus being known in Australasia,

not counting the Lesser Sunda Islands. *H. puella* is further of interest as an inhabitant of both Celebes and Sula. The type of the species is from Sula, and the birds from these islands are said by Sharpe to be "a little deeper azure-blue than the Celebes birds", but neither he nor Wallace find them separable. Neither are there any apparent differences in those from Peling and Banggai, nor are any differences to be seen in specimens from the islands off the coast of the Minahassa and in the Gulf of Tomini.

+ * 131. HYPOTHYMIS ROWLEYI (A. B. M.).

Sangi Blue Flycatcher.

a. **Zeocephus rowleyi** *(1)* Meyer, Rowley's Ornithol. Miscellan. 1878, III, 163; *(2)* id., Isis, Dresden 1884, 6.

Hypothymis rowleyi *(1)* Sharpe, Cat. B. IV, 1879, 278; *(II)* Gould, B. New Guinea II, pl. 20 (1882); *(3)* W. Blas., Ornis 1888, 581.

Figure and descriptions. Gould *II*; Meyer *a 1*; Sharpe *1*.

Adult. Above dusky China-blue, brightest on supra-loral region, lesser wing-coverts and mantle; the quills washed externally with greyer blue; under parts from chin downwards bluish French-grey, darker on the sides of the breast, paler and washed with buff about the anal region; quills and tail below dusky smoke-grey, the inner webs of the quills whitish. Bill — in dry specimen — blackish, under mandible paler; feet and claws greyish. Wing 96 mm; tail 92; tarsus 21; bill from nostril 9.5 (Tabukan, Great Sangi — Nr. 2956, type: Meyer).

Distribution. Great Sangi (Meyer).

Remarks. The type of this Flycatcher in the Dresden Museum remains up to the present the only specimen on record. It is much larger than *H. puella* of Celebes: wing 96 mm as against 77 maximum; the upper surface is of a much darker blue, and this colour is not carried on to the chin, throat and chest, which are uniform with the rest of the under surface. It differs, moreover, in the form of the bill from *H. puella*, the nostrils being more deeply sunk in larger cavities, between which the ridge of the culmen stands up more strongly. In this respect, it appears to be a connecting link between *Hypothymis* and *Zeocephus cyanescens* Sharpe of Palawan, a species a good deal similar in coloration; but distinguishable by its black lores and black line along the forehead and chin at the base of the bill, by its larger bill and longer tail.

The type of *H. rowleyi* was found by one of Meyer's hunters near the village of Tabukan on Great Sangi. Up to the present no Blue Flycatcher has been discovered on Siao or the other Sangi Islands, and it is probable that the nearest relations of *H. rowleyi* may still be found — there, or elsewhere. At present its nearest affinities appear to be with *H. puella* of Celebes and Sula, while *Stoparola panayensis* also deserves consideration as an ally.

Hypothymis manadensis (Q. G.). This species, as Oustalet has shown (Bull. Soc. Philom. Paris, Dec. 1877), is from New Guinea — not Celebes. It is the same as *Monarcha dichrous* Gray (cf. Sharpe, Cat. B. IV, 273, 421; Salvadori, Orn. Pap. II, 29).

GENUS RHIPIDURA Vig. Horsf.

The tail of the Fan-tailed Flycatchers is much longer than the wing, graduated, the feathers broad; the 4th and 5th remiges are longest, the second about as long as the secondaries; the bill is moderate, thickly beset with rictal and frontal bristles, reaching nearly to the tip of the bill; the tarsus is (always?) longer than the middle toe and claw. Büttikofer (1893) recognises 75 species, ranging from Australia and New Zealand as far as the Himalayas and many islands of Polynesia, as well as throughout the East India Archipelago.

† * 132. RHIPIDURA CELEBENSIS Bütt.

Southern Fan-tailed Flycatcher.

Rhipidura celebensis *(1)* Büttik., Notes Leyden Mus. 1893, XV, 79; *(2)* Hart., Nov. Zool. 1896, 167, 173, 182, 585.

Adult [male]. Crown, hind neck, fore part of mantle, lesser wing-coverts, and thighs dark earthy brown; quills and greater wing-coverts sepia-brown, edged with the colour of the crown; remaining upper surface, including forehead, rufous; tail blackish, exposed webs iron-grey, basal part — except on outermost pair — red, tips white, broadest on outermost pair, on the outer webs of which the white runs some distance towards the base; lores, sides of face, throat and chest black, the chest bordered below with white-tipped feathers; malar streak from chin to sides of chest white; chin white; remaining under-parts white, tinged with fulvous on flanks, vent, and under tail-coverts; inner edge of quills below ashy whitish. Bill dark brown, white at base of lower mandible, feet dark brown. Wing 66 mm; middle tail-feathers 85, outermost 62; tarsus 20; culmen 13 (ex Büttik.). "Iris dark brown; bill dark brown; mandible ochreous dark brown towards the tip; legs pale grey" (Everett *2*).

Distribution. ? South Peninsula, Celebes — Macassar (Teijsmann); Djampea and Kalao (Everett *2*).

This Flycatcher was described from a single specimen in the Leyden Museum. Mr. Büttikofer remarks that it is "very closely allied to *R. semicollaris* M. & S. from the Timor group, but easily distinguished by the darker tinge of the earthy brown parts of the upper surface and the broader black band across the lower throat and chest". In *R. teijsmanni* of South Celebes the tail is cinnamon-red, with the terminal third sepia-brown, and across the chest there is only a narrow bar of black, not bordered with white below.

The nearest ally of *R. celebensis* at present known is *R. sumbensis* Hart., to which Mr. Hartert allows only subspecific rank, though he has not shown that the two forms intergrade. In three skins of the latter no differences of colour could be detected by Mr. Hartert, but they were not well prepared specimens; they proved to be considerably larger in size. Mr. Hartert queries the label "Macassar" indicated as the locality of Mr. Büttikofer's type, and it is indeed strange, if the bird occurs there, that it should have escaped Wallace,

Meyer, Platen, Weber, the Sarasins, Everett, Doherty etc. Teijsmann visited Saleyer, but we do not know that he was ever on Djampea or Kalao.

Mr. Hartert's male from Kalao was found to be identical with Teijsmann's specimens by Mr. Büttikofer.

+ * 133. RHIPIDURA TEIJSMANNI Bütt.

Teijsman's Fan-tailed Flycatcher.

Rhipidura teysmanni *(1)* Büttik., Notes Leyden Mus. 1893, XV, 80; *(2)* id., Zool. Erg. Weber's Reise in Ost-Ind. 1893, III, 278; *(3)* Hart., Nov. Zool. 1896, 157; *(4)* id., ib. 1897, 158.

Description. Büttikofer *1.*

Adult. Crown, sides of head, neck and upper part of mantle olive-brown; forehead, back, rump, flanks, thighs, upper and under tail-coverts and basal two-thirds of all the tail-feathers cinnamon-red; terminal third of tail sepia-brown, fringed towards the tip with cinnamon-red, and tipped with ashy fulvous, most broadly on the outermost feathers; upper wing-coverts sepia-brown, edged with olive-brown; primaries sepia-brown, secondaries olive-brown, the exposed webs of all, except first primary, fringed with cinnamon; chin and upper throat pure white; a rather narrow black bar across the chest; under parts cinnamon; pale whitish fulvous on middle of breast and abdomen; under wing-coverts fulvous; quills below very broadly edged on the inside with vinaceous. Bill blackish, whitish at base; feet pale brown. Wing 69 mm; middle tail-feathers 80, outermost 60; tarsus 19; bill from front 12 (ex Büttik. *1*). "Iris very dark chestnut-brown; feet pale purplish; beak blackish, pale at base of mandible" (Doherty *4*).

An adult male differs from Mr. Büttikofer's description by having the breast below the black jugular collar greyish olive, in the middle inclining to buff, and only about the terminal fourth of the tail is dull sepia or blackish (♂, Loka, S. Cel., 6. X. 95: P. & F. Sarasin).

Young. More suffused with cinnamon-red than the adult, especially on the outer edges of the wings and on the flanks. Black jugular collar absent; the cinnamon-red loral patch nearly absent; under parts darker cinnamon, stained with brown on the breast; chin and throat greyish white (♂ Loka, 10. XI. 95: P. & F. S.).

Distribution. South Peninsula of Celebes — (?) Macassar (Teijsmann *1*), Mt. Bonthain (Weber *2*, Everett *3*, P. & F. Sarasin, Doherty *4*).

This Flycatcher was recently described by Mr. Büttikofer after a single specimen obtained by Teijsmann and labelled at Macassar (but in all probability from the mountains); and two others killed at Loka, 4000 feet, were subsequently sent to the Leyden Museum by Prof. Weber. In the Loka neighbourhood it was found by the Sarasins, Everett and Doherty. It appears to be a very distinct species. Mr. Büttikofer remarks that "*R. rufifrons* from Australia may be considered its nearest ally. From this latter as well as from the other species of the group [with forehead, back, and base of tail cinnamon-red], it differs principally in the red of the basal part of the tail being much more widely distributed, fully occupying the basal two-thirds and being as plainly

visible on the under surface as on the upper, while in all the other species the tail, when closed, hardly shows any red region beyond the under tail-coverts".

In his careful description Mr. Büttikofer remarks: "The shafts of the tail-feathers have the color of the accompanying parts of their webs, but the red of the basal part runs, though not very far, into the black terminal third". This seems at first sight to show that the red pigment is on the increase and is supplanting the black. Were the black, on the other hand, to encroach into the red it might be inferred with some degree of reason that the extent of red on the tail had once been greater than at present. But it may be that a contradiction to this is presented by the young, which is more suffused with cinnamon-red, and this colour is seen all along the shaft to the tip of the tail and dimly against the blackish web alongside the shaft for its terminal fourth. The young plumage of birds is often supposed to be more ancient than the adult plumage; if so, the tail of *R. teijsmanni* is increasing in blackness on its distal end, and the cinnamon is receding towards the base. But such questions are hardly for the present generation.

The genus *Rhipidura* is unquestionably Australasian in type. Of Mr. Büttikofer's 75 species 62 belong to the Australian Region, including the Lesser Sunda Islands. The remaining range from the Philippines, Celebes and the other Great Sunda Islands to the Himalayas. The Papuan Islands — 24 species, and the Lesser Sunda Islands — 10 species — are by far the richest in forms, and it is here, possibly, that the genus originated. We infer that its distribution took place mainly, if not entirely by flight, from the fact that numerous species are found in the volcanic islands of Central and North-west Polynesia, and that of two Indian species Mr. Büttikofer places one between species of New Guinea and Fiji, the other between species of New Guinea and the Solomon Islands. Consequently the genus cannot be taken into consideration on the question of the former distribution of land and water in the East Indies, nor can the two Celebesian species be regarded as trustworthy links between Celebes, Timor and Australia, though like *Cacatua sulphurea* and *Circus assimilis* they probably reached Celebes from those countries.

On *R. teijsmanni* the Sarasins write: "It is very plentiful on the whole Peak of Bonthain up to great elevations, 1500 m and more, and indeed a characteristic bird. It flies in pairs and quietly allows itself to be watched. The tail is carried spread out, like a fan".

Rhipidura lenzi W. Blas. The habitat of this species was originally indicated by Lenz (J. f. O. 1877, 374) as North Celebes, and in 1883 it was found to be new and was described by W. Blasius (J. f. O. 1883, 145). The correctness of the habitat was questioned by Meyer (Isis 1884, 26), and the same year

the species was recorded by H. O. Forbes from Amboina (P. Z. S. 1884, 431), and later again mentioned from the same island by Büttikofer (Notes Leyden Mus. 1893, XV, 92). These two Amboina specimens are somewhat smaller than W. Blasius's type, and it may be doubted where that bird really came from, though Amboina or the neighbourhood are the most probable localities (cf. also Salvad., Agg. Orn. Pap. 1890, 77).

GENUS ZEOCEPHUS Bp.

A Philippine genus of Flycatchers, now known also from Talaut. The bill is very large, the culmen from the cranial suture about as long as the cranium, and longer than the tarsus, the rictal bristles large; wing rather long, the second quill about as long as the secondaries: the tail long, as long or longer than the wings, the two middle feathers more or less produced. The Talaut bird and one of the Philippine species are of a cinnamon-rufous colour, another form is greyish blue. The feathers of the head are rather short and velvety.

† * 134. ZEOCEPHUS TALAUTENSIS M. & Wg.

Talaut Ferruginous Flycatcher.

Plate XVI.

Zeocephus talautensis *(1)* M. & Wg., J. f. O. 1894, 243; *(2)* iid., Abh. Mus. Dresd. 1895, Nr. 9, p. 4.

"Tabaheo", Talaut, Nat. Coll.

Adult. Above and below deep orange-ferruginous, somewhat the darkest on the under surface; tail duller; chest, and ear-coverts tinged with chestnut; inner webs of quills dusky for about their terminal half. Bill and feet in the skin leaden black (type, Salibabu, "♂" 28. Oct. 1893, Nat. Coll. — C 13162).

Younger. Like the adult, but below much paler; the lower breast and abdomen whitish; the head above washed with brown; tail-feathers darker, passing into dusky for about the terminal 10 mm of the 3 middle pairs, shafts dark brown. Under bill greyish horn-colour (Kabruang, 11. XI. 93 — C 13160).

Measurements. Wing 88—95 mm; tail 82—95; bill from nostril 14.5—15.5; tarsus 17 mm c.

Distribution. Talaut Is. — Kabruang, Salibabu and Karkellang (Nat. Coll. in Dresd. and Tring Museums).

Numerous examples of this Flycatcher were obtained by our native collectors in Talaut on three expeditions in 1893, 1894 and 1896. They were killed in the autumn or late autumn, and at this time, when the rainy season is commencing, the birds moult. *Zeocephus* has hitherto been known only as a Philippine genus, and *Z. talautensis* speaks for the Philippine character of its habitat, also shown by other species; though again other Talaut species have their nearest affinities in Sangi and elsewhere.

The present species may be distinguished from *Z. rufus* (Gray) of the Philippines — Luzon, Panay, Negros, Marinduque, Mindoro, Mindanao, Basilan,

Sooloo, Tablas, Romblon, Sibuyan, Cebu (Steere, Platen, Everett, Bourns & Worcester, etc.) — by its having, when adult, the two middle tail-feathers produced only about 5 mm beyond the others, instead of about 35 mm, and by its brighter and more orange plumage. The paler immature bird, which we have received from Salibabu as well as from Kabruang, resembles the young of *Z. rufus* (separated as *Z. cinnamomeus* by Sharpe), but differs, as shown *(1)*, in certain points.

GENUS MONARCHA Vig. Horsf.

Structurally similar to *Zeocephus*, but the tail much shorter than the wing, and the middle pair of rectrices not lengthened, the bill somewhat smaller, the culmen from the suture about as long as the tarsus and barely as long as the cranium. The genus is found from Australia as far as Talaut, Sangi, Sula, Djampea, and Timor.

+* 135. MONARCHA COMMUTATUS Brügg.

Sangi Grey-and-rufous Flycatcher.

Plate XVI.

a. **Monarcha commutata** *(1)* Brüggem., Abh. Ver. Bremen 1876, V. 68.

b. **Monarcha inornatus** partim *(1)* Salvad., Orn. Pap. 1881, II, 14 (Celebes).

Monarcha commutatus *(1)* W. Blas., J. f. O. 1883, 120, 156, 161; *(2)* Meyer, Isis, Dresden 1884, 6, 22; *(3)* id., Ztschr. ges. Orn. 1886, 24; *(4)* W. Blas., Ornis 1888, 580, 641; *(5)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 2, p. 14.

"Tarumisi kaooraneng", Siao, Nat. Coll.

Descriptions. W. Blasius *1*; Meyer *2*; Brüggemann *a 1*.

Adult. Upper surface, throat and upper chest slate-grey, slightly washed with olive-grey; remaining under parts dark orange-rufous; forehead and chin at the immediate base of bill blackish; wings and tail dusky, the exposed parts of the feathers washed with the colour of the upper surface. Bill lead-colour with patches of silvery, tips whitish (Siao, 25. VI. 93; Nat. Coll. — C 12623).

Young. Wings and tail fulvescent; front and chin less black; fore-neck below sensibly tinted with cinnamon (Meyer *2* — Great Sangi). It is not impossible that this may be racially distinct from the Siao form.

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (Darmst. Mus. type ex *2*) ad. N. Celebes?	86	79	17—18	—
b. (Dresden Mus.) ad. Siao	87	80	18	—
c. (C 12623) ad. Siao, 25. VI. 93	82	72	18	13.5
d. (C 12624) ad. Siao, 27. VI. 93	—	73	18.5	13
e. (C 12622) ad. Siao, 18. VI. 93	87	74	18.5	13

Distribution. Sangi Islands: Siao (Meyer *2*, Nat. Coll. in Dresden and Tring Museums), Great Sangi (Meyer *2*); ? Celebes — near Manado (Fischer *a 1, 1*).

The type *M. commutatus* was indicated to have come from Manado, but it now appears most certain that the specimen was mislabelled and it probably came from Siao. The locality Great Sangi rests at present only upon a young specimen in the Dresden Museum, which, as Meyer has already said *(2)*, may possibly prove to be not perfectly identical with the Siao birds. Siao, therefore, is as yet the only positively ascertained locality for the species or race. Here it seems to be not uncommon, as our native collectors were able to send us the full complement of five specimens asked for. In Great Sangi, the bird was obtained neither by our native collectors nor by Dr. Platen.

As compared with adult specimens of *M. inornatus* — one from Aru, two from (?) the Moluccas, four from Peling and Banggai, two from Djampea, and a large series from Talaut — *M. commutatus* is distinguishable by the somewhat darker grey of its plumage and its blacker edge of forehead and upper corner of chin. Prof. W. Blasius rightly remarks that it seems to be a darker and larger variety of *inornatus*; individuals appear, however, to vary a good deal in size. It is difficult to know how to treat of such a form as this; it might be preferable to view it as a subspecies of *M. inornatus*, but that species is involved in much obscurity at present as regards its local variations, and its treatment as species and subspecies must be left to the future.

The genus *Monarcha* is typical of the Australian and what Wallace terms the Austro-Malayan subregions. The occurrence of a form of *M. inornatus* in the Sangi Islands is a link between them and the Moluccas and Papuasia, but the wide distribution of this species tends to show that is has spread its range recently by flight, and is has, therefore, nothing reliable to say for a former land-connection between Sangi and the Moluccas.

The plumage of this bird has a curious resemblance to that of the adult male *Monticola solitaria*.

† 136. MONARCHA INORNATUS (Garn.).

Grey-and-rufous Flycatcher.

a. **Muscicapa inornata** *(1)* Garnot, Voy. Coquille, Zool. Atl. 1826, pl. 16, fig. 2.
b. **Drymophila cinerascens** *(1)* Temm., Pl. col. 1827, pl. 430, fig. 2.
c. **Monarcha cinerascens** *(1)* Wall., P. Z. S. 1862, 335, 341.

Monarcha inornatus *(1)* Sharpe, Cat. B. IV, 1879, 431; *(2)* Salvad., Orn. Pap. II, 1881, 14; Agg. 1889, 71; *(3)* Tristr., Cat. Coll. B. 1889, 201; *(4)* M. & Wg., J. f. O. 1894, 244; *(5)* iid., Abh. Mus. Dresd. 1895, Nr. 9, p. 4; *(6)* iid., ib. 1896, Nr. 2, p. 14; *(7)* Hart., Nov. Zool. 1896, 173, 241.

"Tabaheo mawora", Talaut, Nat. Coll.

"Tangkuis", Peling; **"Tangkuisi"**, Banggai (Nat. Coll.).

For full synonymy see Salvadori *2*.

Figures and descriptions. Garnot *a I*; Temminck *b I*; Sharpe *1*, Salvadori *2*.

Adult. Like *Monarcha commutatus* (see *antea*), but the grey of the upper surface, throat, and chest, paler — the last-named parts olive-grey as against almost mouse-grey.

Distribution. Talaut Is. — Karkellang and Kabruang (Nat. Coll.); Peling and Banggai (Nat. Coll.); Sula Islands (Allen *c 1, 1, 3*); Djampea (Everett *7*); Timor (Wallace *1*) and the Moluccas (Salvadori *2*) to Aru, New Guinea, the Admiralty Islands and Duke of York Island (Salvad. *2*).

Observations. A specimen from the Sula Islands in the British Museum and another from the same locality in the Tristram Collection are identified with this species by Dr. Sharpe and Canon Tristram.

Latterly a score of specimens collected in Talaut in the autumn of 1893, 1894, and 1896 have been sent to the Dresden Museum, and curiously enough they do not agree with the Sangi race, *M. commutatus*, but are like the Eastern form.

A few specimens from Peling and Banggai are more suffused with chestnut-rufous below and paler grey on the head and face than those of Talaut, Djampea, Aru, and others labelled "? Moluccas".

Two from Djampea are darker grey on the throat and breast than one from Aru.

Salvadori includes Meyer's *M. geelvinkianus* and *fuscescens* in the synonymy of *M. inornatus*, a species which might some day perhaps be split up into 20 geographical races with three or more names attached to each — if any good purpose were served by so doing. Individual variation in this species seems to be confined within somewhat narrow limits.

It may safely be assumed to have spread its range by flight. Its absence on the mainland of Celebes is very curious.

* 137. MONARCHA EVERETTI Hart.

Djampea Black-and-white Flycatcher.

Plate XVII.

Monarcha everetti *(1)* Hart., Nov. Zool. 1896, 173, 182.

Adult male. Upper surface, including face, throat and jugulum black, glossed with steel-blue; rump and upper tail-coverts, body below, under wing-coverts and remiges where they rest upon the body white; thighs black, with some white tips to the feathers; tail black, white at the concealed base, the lateral feathers white for the terminal half, the white decreasing to a tip of a few mm in the 4th pair and disappearing on the middle pair (♂, Dec. 1895, Djampea Id.: Everett — C 14871).

"Iris dark brown; bill and legs light blue; claws dark grey" — Everett *1*.

Immature [male]. Mantle cinereous grey (H. *1*).

Measurements. "Length about 14 cm; wing 66—69 mm; tail about 70—72; tarsus 19; culmen 16—17" (Hartert *1*).

Female. Entirely different from the male: "Above cinereous grey, slightly washed with brown. Lores whitish. A spot behind the eye pale whitish grey. Wings dark brown, inner webs white towards the base. No white on rump and upper tail-coverts; tail as in the male. Under surface whitish, washed with pale orange-rufous, especially on the breast; abdomen almost white. Thighs pale brownish, under wing-coverts and axillaries dirty white. Iris chocolate; bill pale lead-blue, black at apex; legs dark slate-blue; claws blackish" (Hartert).

Distribution. Djampea Island between Celebes and Flores.

This, as Mr. Hartert points out, is a very distinct species, belonging to Gould's genus *Piezorhynchus*, "if that genus can be separated from *Monarcha*". He adds that in this genus "the female always differs from the male"; but it would seem that the word "generally" should have been used here. Sharpe (1879) admits the genus *Piezorhynchus*, with 20 species in the Australian Region, said to be distinguishable from *Monarcha* by the velvety character of the plumage of the head; Salvadori (1881) unites it with *Monarcha*.

GENUS MYIAGRA Vig. Horsf.

Bill moderately long, very broad and flat, across the nostrils about twice as broad as deep, rictal bristles well developed; wings longer than tail, the second primary about equal to the secondaries in length; feet small, the middle toe and claw shorter than the tarsus. The genus is found from Australia to the Lesser Sunda Islands and the small islands to the south of Celebes, the Moluccas, and many groups of Polynesia.

138. MYIAGRA RUFIGULA Wall.

Timor Broad-billed Flycatcher.

Myiagra rufigula *(1)* Wall., P. Z. S. 1863, 485, 491; *(2)* Pelz., J. f. O. 1875, 51; *(3)* Sharpe, Cat. B. 1879, IV, 382; *(4)* Sclat., P. Z. S. 1883, 55; *(5)* Büttik., Notes Leyden Mus. 1892, XIV, 197; *(7)* Hart., Nov. Zool. 1896, 171, 585.

Adult male. Above dark lead-grey; entire head above, nape, and ear-coverts blackish leaden, with a greenish gloss, on forehead next the bill paler; chin, throat, and chest ferruginous; remaining under parts white, washed with buff, more strongly at the sides and on the under wing-coverts; remiges and tail blackish, the latter bordered above with the lead-grey of the back, the remiges with browner grey; paler below, especially where they rest upon the body (♂, Bonerate Id., 20. III. 96: P. & F. Sarasin).

Female. Differs from the male in having the head, nape, and ear-coverts similarly glossed with greenish, but less dark leaden — very little darker than the back, — the ferruginous of the chin, throat, and chest lighter. The outermost tail-feather whitish along the outer web, and it and the next rectrix incline to brownish white distally. "Iris dark brown; bill black, mandible pale blue, with black tip; legs and claws greyish black" — Everett 7 (♀, Bonerate, 20. III. 96: Sarasin Coll.).

Measurements (4 specimens). Wing 66—69 mm; tail 63—66; tarsus c. 17.5; bill from nostril c. 8.5.

Distribution. Timor and Samao (Wallace *1*, *3*); Sumba (ten Kate *5*, Doherty *7*); Djampea and Kalao (Everett *7*); Bonerate (P. & F. Sarasin).

This Broad-billed Flycatcher was discovered first by Everett in December, 1895, and then by the Sarasins in March, 1896, in the above mentioned small islands between Celebes and Flores, which are included in the Celebes Province in this work. The type came from Samao.

The genus *Myiagra* is an Australasian type, most plentifully represented in Papuasia and the Melanesian Islands. The present species is probably most nearly related to *M. fulviventris* Sclat. of Timorlaut, which differs by its fulvous belly and under wing-coverts. *M. albiventris* (Peale) of Samoa has, as Hartert points out, black lores, a larger bill and less rufous below, so distinguishing itself from this Tenimber form.

GENUS CULICICAPA Swinh.

These little Flycatchers have the bill as broad and flat as *Myiagra*, but more pointed and triangular, the rictal bristles are large, nearly as long as the bill. The tail is square, shorter than the wing, the quill-formula much as in *Myiagra*; the middle toe and claw slightly shorter than the tarsus. They are well characterized by their principal colours of yellow and yellow-olive, and the sexes are similar. Only two species are known, with a range from the Himalayas to the Philippines and Celebes.

139. CULICICAPA HELIANTHEA (Wall.).

Wallace's Yellow Flycatcher.

a. **Muscicapa helianthea** *(1)* Wall., P. Z. S. 1865, 476; *(2)* Gray, HL. 1869, I, 321; *(3)* Rosenb., Malay. Archip. 273.

b. **Myialestes helianthea** *(1)* Wald., Tr. Z. S. 1872, VIII, 66, pl. 7, fig. 1; *(2)* Brüggem., Abh. Ver. Bremen 1876, V, 68; *(3)* Wallace, Island Life 1880, 433; *(4)* Guillem., P. Z. S. 1885, 552.

Culicicapa helianthea *(1)* Salvad., Cat. Ucc. Borneo 1874, 135; *(2)* Sharpe, Cat. B. IV, 1879, 370; *(3)* M. & Wg., Abh. Mus. Dresd. 1895, Nr. 8, p. 9; *(4)* iid., ib. 1896, Nr. 2, p. 14; *(5)* Grant, Ibis 1896, 543; *(6)* Hart., Nov. Zool. 1896, 157, 171; *(7)* id., ib. 1897, 158; *(8)* Grant, Ibis 1897, 227.

c. **Xantholestes helianthea** *(1)* Sharpe, Tr. Linn. Soc. 1877, (2) I, 327.

d. **Xantholestes panayensis** *(1)* Sharpe, Tr. L. Soc. 1877, (2) I, 327.

e. **Culicicapa panayensis** *(1)* Sharpe, Cat. B. IV, 1879, 371; *(2)* Steere, List Coll. B. & M. Philipp. 1890, 16; *(3)* Bourns & Worces., B. Menage Exped. 1894, 41; *(4)* Grant, Ibis 1894, 506; *(5)* id., ib. 1895, 443.

"Koko intiwoho", Manado Distr., Nat. Coll.

"Tangkui mosoni", Banggai, Nat. Coll.

Figure and descriptions. Walden *b I*; Wallace *a 1*; Brüggemann *b 2*; Sharpe *2*.

Adult. Above olive-green-yellow, darkest on the crown, becoming bright yellow on the rump; quills and tail-feathers blackish, the outer webs fringed with greenish ochre; lores yellow; ear-coverts yellower than the crown; chin, throat and remaining under parts lemon-yellow, purest and lightest on chin, throat, under wing-coverts and flanks, dirtier on the breast and sides (Lotta near Manado, 8. V. 93: Nat. Coll. — C 12279).

"Iris dark brown; maxilla dark sepia, mandible ochraceous orange; legs and claws light sepia, soles of feet yellow" — Everett *6*.

Sexes. Similar in coloration (Brüggem. *b 2*, Hartert *6*).

Measurements (7 examples). Wing 58 (♀) — 63 mm; tail c. 50; tarsus c. 13; bill from nostril c. 6.5.

Distribution. Celebesian and Philippine areas: Celebes — Minahassa (Wall. *a 1, 2*, Guill., P. & F. Sarasin, Nat. Coll.); South Peninsula (Everett *6*, Doherty *7*); Banggai Island (Nat. Coll.); Saleyer Island (Everett *6*). Philippines — Luzon, Panay, Negros, Tawi-Tawi, Tablas, Romblon, Sibuyan, Guimaras, Masbate, Siquijor, Palawan (Moseley, Steere, Bourns & Worcester, Whitehead *d 1, e 2, e 3, e 4, e 5, 5, 8*).

Until the last year or two this little Flycatcher was known only from the northern province of Celebes, the Minahassa; but it has now been discovered south as far as Saleyer and east as far as Banggai, and Mr. Ogilvie Grant has found the bird in the Philippines to be identical, so adding a broad area to its range in the north.

The wide-spread *C. ceylonensis* (Swains.) ranging from the Himalayas to Ceylon, Java, and Bornéo differs in having the entire head and throat ashy grey, and *C. helianthea* was separated from it nominally by Dr. Sharpe as a different genus *(c 1)*, but no generic characters were pointed out, and later the author reunited them with *Culicicapa*.

Mr. Wallace mentions *C. helianthea* as a Himalayan type in Celebes; the genus, however, is as much Sundan as Himalayan. To the east *Culicicapa* is not known in the Australian Region, and, like nearly all the other Flycatchers of Celebes, it seems to suggest the probability of the former connection of the island with Asia, and separation by the sea from Australasia.

GENUS GERYGONE J. Gd.

The position of this genus seems to be between the *Muscicapidae* and *Sylviidae*. The sexes are similar in coloration and the young are probably very like them, though at least one species *(G. brunneipectus)* has brownish edgings to the feathers of the breast. The tarsus is rather large, much longer than the middle toe, by which it approaches the Warblers; the bill is more Flycatcher-like, of moderate size. about $1^1/_2$ times as broad across the nostril as deep, the nasal area is membranous, the aperture long oval apparently, the rictal bristles few and rather small; wing longer than tail, the 3rd, 4th and 5th quills the longest, the second equal to, or a little longer than the secondaries. The genus is pre-eminently Australasian, but occurs west as far as Borneo.

+ * 140. GERYGONE FLAVEOLA Cab.

Drab-and-yellow Flycatcher.

Gerygone flaveola *(1)* Cab., J. f. O. 1873, 157; *(2)* Meyer, t. c. 404; *(3)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 665; *(4)* Sharpe, Notes Leyden Mus. 1878, I, 29, part.; *(V)* id., Cat. B. IV, 1879, 214, part., pl. V, fig. 2; *(6)* W. Blas., J. f. O. 1883, 117, 125; *(7)* Guillem., P. Z. S. 1885, 263, pt., 414, pt.; *(8)* Salvad., Ann. Mus. Civ.

Gen. 1891, XXXII, 53; *(9)* Davison, Ibis 1892, 100; *(10)* Sharpe, Ibis 1893, 561; *(11)* Büttik., Notes Leyden Mus. 1893, XV, 174, 175; *(12)* id., Zool. Erg. Weber's Reise Ost-Ind. 1893, III, 278; *(13)* M. & Wg., Abh. Mus. Dresden 1896, Nr. 1, p. 10; *(14)* Hart., Nov. Zool. 1896, 157, 171; *(15)* id., Nov. Zool. 1897, 158, 162.

Figure and descriptions. Sharpe *V*, Cabanis *1*.

Adult. Above drab, washed with olive, head greyer, edges of quills paler; lores dusky whitish; ear-coverts drab, washed with yellow; under surface, including submalar region, sulphur-yellow, darker and brighter on throat, paling down into yellowish white on the under tail-coverts; under wing-coverts almost pure white; inner edges of quills whitish; inner edges of lateral pairs of rectrices whitish near tip: "Iris crimson or red-brown; beak black, in one, evidently younger bird, the base of the mandible is pale" (Doherty *15*); feet blackish *(15)*. (Macassar, ♂, January, 1873: Meyer — C 491.)

Sexes. Similar (♀ ad. C 448).

Measurements.	Wing	Tail	Tarsus	Bill from nostril
a. (C 491) ♂ ad. Macassar, I. 1873	56	40	18.5	6.5
b. (C 449) ♂ ad. Macassar, I. 1873	54	38	17.5	6.5
c. (C 448) ♀ ad. Macassar, I. 1873	54	39	17.5	7.0
d. (Sarasin Coll.) ♂ ad. Loka, S. Cel., 21. X. 95 . .	52	37	17	6.5
e. (Sarasin Coll.) ♂ ad. Macassar, 19. VII. 95 . . .	52	38	16.5	6.5
f. (Sarasin Coll.) ♂ ad. Macassar, 16. VII. 95 . . .	52	37	—	7
g. (Sarasin Coll.) — Lake Posso, Feb. 95 . . , . .	54	40	—	7

Mr. Hartert *(15)* remarks that the wings of his two examples from Saleyer Island are only 49—50 mm long, and they are slightly paler, "though this latter character is probably due to their being in worn plumage".

Distribution. Celebes — Macassar (Meyer *1*, in Berlin and Dresd. Mus., P. & F. Sarasin); Bonthain Mountains (P. & F. Sarasin, Everett *14*, Doherty *15*); Luwu at the head of the Gulf of Boni (Weber *12*); Kandari, S. E. Celebes (Beccari *3*); Lake Posso, Central Celebes (P. & F. Sarasin); Dongala and Tawaya, W. Celebes (Doherty *15*).

This was one of Meyer's discoveries in South Celebes. No specimens of this species have as yet been obtained in North Celebes, and the bird is somewhat rare in collections. It is most nearly allied to *G. salvadorii* Büttik. of Borneo, or perhaps to the Sooloo form, in which Dr. Guillemard points out some distinguishing characters. The Borneo form was at first united by Dr. Sharpe with *G. flaveola*, but, in separating it as *G. salvadorii*, Mr. Büttikofer *(11)* calls attention to its smaller size, the sides of the breast olive-brown instead of yellow, its wanting the whitish lores and the yellowish wash on the ear-coverts, the upper surface a shade darker, the white near the ends of the inner webs of the tail-feathers forming much larger spots.

Another ally is Salvadori's *Gerygone modiglianii* of Sumatra *(8)*, which Sharpe considers identical with Davison's *G. pectoralis* of the Malay Peninsula (Ibis 1892, 99; 1893, 119, 561) and which, in his opinion, is questionably distinct from the Bornean form of Büttikofer. From *G. flaveola*, as Salvadori points

out *(8)*, *G. modiglianii* differs in having a distinct dusky collar on the sides of the neck, the upper surface darker, the yellow below a little clearer, a distinct subterminal black band on the tail. *G. sulfurea* Wall. of Solor near Flores differs by its smaller size, a broad median black band across the tail-feathers, with a large white spot at the tip of the inner web (Sharpe).

The genus *Gerygone*, as may be seen from Count Salvadori's great work, is absent, so far as is known, from the Moluccas. The genus is divided by Sharpe into two, *Gerygone* and *Pseudogerygone*, the latter with the secondaries of somewhat increased length — an unsatisfactory character, we think, whereon to base a genus. Taking the two together as one genus, *Gerygone* ranges from the Malay Peninsula through the Sunda Islands and Philippines, to Australia, New Guinea, New Caledonia, Norfolk Island, New Zealand and the Chatham Islands, as shown by Sharpe. From their richness in species it may be supposed to have arisen in New Guinea or Australia, whence it seems to have spread its range by flight.

Gerygone is placed among the *Muscicapidae* by Sharpe, who rightly remarks that it is one of those genera which evince a great likeness to the Warblers. It is in fact almost, if not quite, impossible to draw a line between the Flycatchers and Warblers. Gould, who left the family to which it belongs doubtful, says that "their food consists of insects of the most diminutive size, such as aphides, gnats and mosquitos. They mostly frequent the thick umbrageous woods, where they flit about under the canopy of the dense foliage, or sally forth into the open glade like true Flycatchers" (Hb. B. Austr. 1865, I, 265).

GENUS PRATINCOLA K. L. Koch.

The Chats are treated as a family, *Saxicolidae*, by many authors; by Oates (Faun. Br. Ind. B. II, 1890, 57) as a subfamily of the *Turdidae*. We do not know how *Pratincola* can be separated from the Flycatchers, all that can be said for it is that its bill is less wide and its feet larger than in most of the *Muscicapidae*. Bill shorter than cranium, across the nostril about as wide as deep; nostril roundish, the feathers of the forehead impinging to its base; rictal bristles moderate, two or three frontal bristles reaching over the nostril; chin-feathers with hairy ends; 2nd primary about as long as the secondaries; tip of wing formed by the 3rd—6th primaries; tail rounded, shorter than wing; tarsus longer than middle toe and claw. Sexes dissimilar. Range: Europe, Africa, Asia, as far as Celebes and Flores.

+ 141. PRATINCOLA CAPRATA (L.).

Indian Pied Bush-chat.

a. **Motacilla caprata** *(1)* Linn., S. N. 1766, I, 335.
b. **Saxicola caprata** *(1)* S. Müll., Verh. Natuurk. Comm. 1839—44, 87; *(2)* id., Reizen Ind. Archip. 1858, II, 8.

Pratincola caprata *(1)* Wald., Tr. Z. S. 1872, VIII, 63; *(2)* Salvad., Ucc. Borneo 1874, 252; *(3)* Wald., Tr. Z. S. 1875, IX, 193; *(4)* Cab. & Rchw., J. f. O. 1876, 319; *(5)* Salvad., P. Z. S. 1877, 194; *(6)* Tweedd., P. Z. S. 1877, 696, 761; 1878, 710; *(7)* Sharpe, Cat. B. IV, 1879, 195; *(8)* Legge, B. Ceylon 1880, 431; *(9)* Salvad., Orn. Pap. II, 1881, 420; *(10)* Scully, Ibis 1881, 440; *(10bis)* W. Rams., Tweedd. Orn. Works 1881, App. 657; *(11)* Vorderm., N. Tdschr. Ned. Ind. 1882, XLII, 65; *(12)* Davison, Str. F. X, 1882, 307; 1889, 389; *(13)* W. Blas., Verh. z.-b. Ges. Wien 1883, 75; *(13bis)* Oates, B. Br. Burmah 1883, I, 281; *(14)* Marshall, Ibis 1884, 415; *(15)* C. Swinh. & Barnes, Ibis 1885, 124; *(16)* W. Blas., Ztschr. ges. Orn. 1885, 277; *(17)* Guillem., P. Z. S. 1885, 506; *(18)* Dresser, Ibis 1889, 86; *(20)* St. John, t. c. 163; *(21)* Radde & Walter, Ornis 1889, 61, 168, 172, 221, 256, 259, 266; *(22)* Tristr., Cat. Coll. B. 1889, 143; *(23)* Dresser, Ibis 1890, 342; *(24)* Oates, Faun. Brit. Ind. B. II, 1890, 59; *(25)* id., ed. Hume's Nests & Eggs Ind. B. II, 1890, 41; *(26)* Steere, List Coll. B. & M. Philipp. Is. 1890, 16; *(27)* Büttik., Notes Leyden Mus. 1891, XIII, 211; *(28)* Hartert, Kat. Mus. Senckenb. Vög. 1891, 3; *(29)* id., J. f. O. 1891, 201; *(30)* Büttik., Notes Leyd. Mus. 1892, 197; *(31)* id., Zool. Erg. Weber's Reise Ost-Ind. 1893, III, 277, 293; *(32)* Grant, Ibis 1894, 505; *(33)* Bourns & Worces., B. Menage Exp. 1894, 39; *(XXXIV)* Dresser, B. Eur. Suppl. I, 1895, 33, pl. 641; *(35)* Grant, Ibis 1895, 441; *(36)* M. & Wg., Abh. Mus. Dresd. 1896, Nr. 1, p. 12; *(37)* Hart., Nov. Zool. 1896, 150, 166, 555, 580, 593; *(38)* id., ib. 1897, 155, 161.

"Tjingan", Tjamba Distr., Platen *16*.

For further synonymy and references see Sharpe 7.

Figure and descriptions. Dresser *XXXIV*; Sharpe 7, Vorderman *11*; Oates *13bis*, *24*.

Adult male. Black; wing-coverts nearest the body for about two-thirds across the wing, rump, upper and under tail-coverts and anal region white. "Iris brown; bill and feet black" (♂, Tjamba Distr., S. Celebes, 30. IV. 78: Platen — C 5376). Wing 67 mm; tail 55; tarsus 22; bill from nostril 8.

Female. Hair-brown, paler below, almost wood-brown on abdomen, lores, chin, and malar region; the middles of the feathers darker; lower rump, upper tail-coverts and under tail-coverts white, tinged with buff; tail black; wing-coverts blackish, with pale brown edges, some of the concealed inner greater and middle coverts mostly white; remiges brown, edged with wood-brown; under wing-coverts whitish brown; bill blackish; legs and feet black (♀, Lake Posso, Centr. Cel., 15. II. 95: Sarasin Coll.).

Young. Mottled all over like a young Robin: above fulvescent edged with darker brown; head blackish brown, streaked down the centre of the feathers with deep fulvous; wing-coverts and quills edged with fawn-colour; under-parts fulvous, slightly varied with dark edges to the feathers of the breast (Sharpe 7).

Eggs. "Dr. Platen obtained eggs of this bird near Rurukan in the Minahassa, which are somewhat paler than those of our *rubicola*. An egg in my collection collected by Oates in Pegu, 20. IV. 81, corresponds with them, is only a trifle smaller, but similarly coloured" (Nehrkorn MS.).

Usually four in number, often three, occasionally five. Rather broad ovals, somewhat pointed; delicate pale bluish green, speckled, mottled and streaked with brownish red, densest at the large end. They vary enormously in size, viz: 15.2—19.5 × 11.2—16.3 mm; average (50 specimens) 17 × 14 mm (India, Hume *25*).

Nest. Usually a shallow, somewhat saucer-shaped pad, composed of soft grass, fine roots, and lined with the same, hairs or other soft material; generally placed on the ground in a hole or impression *(25)*.

Distribution. Transcaspia (Radde *21*, *18*, *23*); S. E. Persia (Blanford *7*); Afghanistan (St. John *20*); Baluchistan (Blanford *7*); Himalayas and India (Hume etc. *24*, *25*); Arrakan (Blyth); Burmah (Oates *13bis*); Tenasserim (W. Ramsay and Davison *13bis*, *24*); Java (Horsfield & Wallace *7*, Vorderman *11*); Lombok (Wallace *7*, etc. *37*); Sumbawa (Guillemard *17*); Sumba (ten Kate *30*, Doherty *37*); Flores (Wallace *7*, Weber *31*); Timor (Wallace *7*, ten Kate *27*); Samao (ten Kate *27*); Saleyer Island (Everett *37*); Celebes — S. Peninsula (S. Müller *b 1*, *b 2*, Wallace *7*, Weber *31*, Platen *16*, etc.), West Celebes (Doherty *38*), Central Celebes — Lake Posso (P. & F. Sarasin *36*), N. Peninsula — Rurukan (Platen fide Nehrkorn); ?Borneo (Brunsw. Mus. *13*); Philippines — Luzon, Panay, Cebu, Negros, Bohol, Masbate, Siquijor *(10bis*, *26*, *33*, *29)*; ?Palawan (Hartert *29*).

Ceylon and Southern India are inhabited by a Stonechat, *P. bicolor* Sykes, which seems to be only a subspecies of *P. caprata*. According to Legge, the typical form differs from *P. bicolor* by its smaller size, the smallness of its bill, the more glossy and intense hue of the black of its upper surface and breast, "and there is generally, more especially in Malay specimens, more white on the rump" *(8)*. The Indian female is described by Oates as having the upper tail-coverts ferruginous; they are almost white in Celebes. *P. caprata* was originally described from Luzon. This bird seems to be a resident in the East India Islands, and one that has established itself there in recent times. Platen got its eggs in North Celebes, Everett in the South. It ranges down the chain of islands from Java to Timor, but its occurrence in Borneo still remains to be fully established, for the two specimens from Verreaux in the Brunswick Museum do not afford sufficient proof. It is a rare species in Celebes and the eggs in the Nehrkorn Collection are the only evidence of the presence of the bird in the north of the island, therefore it requires specimens of the bird itself to establish its occurrence positively; in the south it seems to be rather more plentiful. Five or six of the Philippine Islands have produced examples, Luzon the largest number. It (or a form of it) is, as Mr. Oates remarks *(24)*, a resident species throughout the whole of India and Burmah, except the southernmost part of the Peninsula (where *P. bicolor* replaces it) and portions of Tenasserim. In Turkomenia, however, Drs. Radde & Walter record it as a summer visitant. It has been stated to occur in New Guinea, in virtue of a specimen in spirit obtained during the voyage of the "Gazelle" *(4)*, but Count Salvadori *(5, 9)* is, we should think, probably quite right in regarding the label as erroneous.

The genus *Pratincola*, according to Sharpe, ranges, as remarked above, over the whole of Europe, Africa and Asia extending into the East Indies as far as Celebes and Flores. *P. caprata* is a very distinct species, the bird most like it being, perhaps, *P. albofasciata* (Rüpp.) of Abyssinia, which has a white patch on the sides of the neck.

ORDER ACCIPITRES.

The diurnal Birds of Prey: Hawks, Eagles, Falcons, the Osprey, Vultures; distinguishable by the rigid, hooked, and sharply pointed bill; powerful, hooked claws; three toes in front and the fourth behind (except in the Osprey, in which the outer toe is reversible); usually of great powers of flight; 11 primaries; plumage often varied in coloration, but of sober tints: brown, black, white, grey, rufous, and purplish being found, but pure yellow, blue, red, bright green, and metallic tints are wanting. The *Accipitres* usually build a nest of sticks; the eggs are white or whitish in ground-colour, in many genera very handsomely varied with markings of rufous or brown; the young are hatched helpless and clothed with down.

FAMILY FALCONIDAE.

Containing all the Birds of Prey, except the Osprey (which is distinguished from them by its having the outer toe reversible and pterylologically by its having no aftershaft to the feathers) and the Vultures (which have the head and neck bare, or clothed in down).

GENUS SPILORNIS G. R. Gray.

Birds of Prey of medium size (about as large as a Raven), stout and compact in form, wings moderate; bill not denticulate; a broad nuchal crest; tarsi naked (except the upper fourth anteriorly), reticulated with hexagonal scales; toes short; under parts marked with transverse spots or bars of white; food: chiefly reptiles and amphibians; number of eggs laid: one or two. The genus contains about 12 species of a local and stationary character, distributed from the Himalayas and South China to the Andaman Islands, Celebes and Sula.

* 1. SPILORNIS RUFIPECTUS J. Gd.[1])

Russet-breasted Serpent-harrier.

Under this specific name we include two well-pronounced geographical races, *1. the typical Spilornis rufipectus* of the mainland of Celebes, *2. Spilornis rufipectus*

[1]) The abbreviation of the author's name at the head of each article is taken from the Berlin "Liste der Autoren" (1896), though the form adopted does not always meet with our approval.

sulaensis of the Sula group, and *3.* the individuals inhabiting the Peling group, which are intermediate between these two races. For the treatment of this, and of similar cases, the following method of nomenclature may be adopted without prejudice to ornithology.

1. The typical Spilornis rufipectus.

a. **Spilornis rufipectus** *(1)* Gould, P. Z. S. 1857, 222; *(II)* id., B. Asia, I pl. IX (1860); *(3)* Wall., P. Z. S. 1862, 338, pt.; *(4)* id., Ibis 1868, 16, 21; *(5)* Wald., Tr. Z. S. 1872, VIII, 35; *(6)* Sharpe, Cat. B. I, 1874, 291; *(7)* Salvad., Ann. Mus. Civ. Gen. 1875, VII, 643; *(8)* Brügg., Abh. Ver. Bremen 1876, V, 46; *(9)* Gurney, Ibis 1878, 96, 102; *(10)* W. Blas., J. f. O. 1883, 135; *(11)* Gurney, List Diurn. B. of Prey 1884, 17; *(12)* W. Blas., J. f. O. 1885, 403; *(13)* id., Ztschr. ges. Orn. 1885, 222; *(14)* Guillem., P. Z. S. 1885, 544; *(15)* Hickson, Nat. in N. Celebes 1889, 89; *(XVI)* Meyer, Vogelskel. II 1892, 27, t. CLVII; *(17)* Bütt., Zool. Erg. Webers Reise 1893 III, 271; *(18)* Sharpe, Ibis 1893, 552; *(19)* M. & Wg., Abh. Mus. Dresd. 1895 no. 8, p. 3; *(20)* iid., ib. 1896 no. 1, p. 7; *(21)* iid., ib. 1896, no. 2, p. 7; *(22)* Hartert, Nov. Zool. 1896, 161; *(23)* id., ib. 1897, 159.

b. **Circaetus bacha celebensis** *(1)* Schl., Mus. P.-B. Buteones 1862, 27; *(2)* Rosenb., Malay. Archip. 1878, 271.

c. **Circaetus rufipectus** *(1)* Schl., Valkv. Ned. Ind. 1866, 37, 72, pl. 23, figs. 1—3; *(2)* Gray, HL. 1869, I, 15; *(3)* Schl., Rev. Accip. 1873, 114.

"Kokodschi", Tjamba, S. Celebes, Platen *a 13.*
"Berna" (albescent young), Tjamba, Platen *a 13.*
"Bulièa-mohengo", Gorontalo Distr., N. Celebes, v. Rosenberg *b 2.*
"Kiokkiok", near Manado, Nat. Coll. in Dresd. Mus.
"Boina", Balante, E. Celebes, Nat. Coll.
"Sikep utang besar", Lembeh Id., Nat. Coll.

Figures and descriptions. Gould *II, 1*; Schlegel *c I*; Meyer *XVI* (skeleton); Sharpe *6.*

Diagnosis of race. Wing relatively longer than in *S. rufipectus sulaensis* (see, table of measurements), remiges below greyish white, broadly tipped and barred with blackish. These bars coalesce on the secondaries and base of primaries, enclosing spots of white, mottled with brown.

Old female. Upper surface dark brown, glossed with purple; sides and top of head, crest, and throat black, ear-coverts washed with grey; hind neck dusky, the margins of the feathers here and there, and on the crest, fulvous brown; secondaries and some of the upper tail-coverts tipped with white; carpal edge spotted with white; tail above pale brown, tipped with whitish, and crossed with four broad black bands — the basal one rather indistinct; breast mummy-brown; remaining under-parts — including under wing- and tail-coverts — darker, the lower breast spotted, the sides, abdomen, thighs and under tail-coverts closely barred with white; under side of wing broadly barred and spotted with white (Manado, Nr. 6682).

Younger female. Like the above, but the brown of the upper plumage paler and duller without so much purple gloss; hind neck pale brown, without (or with only a few) yellow-brown margins here and on the crest, the black feathers of which are more or less broken up with yellowish white; tail crossed with three black bands, the

basal one indistinct; breast much paler and more of a dark wood-brown tone (S. Celebes: Platen — C 10707).

Male. Similar to the female, but the white bars of the under parts more sharply defined and extending further towards the breast (whereas in the female they form sooner into disconnected spots); the brown bars on the under tail-coverts narrower (♂ vix ad. S. Celebes — Platen, C 10708; 3 ♂♂ ad. & vix ad. Sarasin Coll., N. & S. Celebes).

"Iris gold-yellow; periocular skin and cere green-yellow; bill blue-black; feet lemon- (or gold-) yellow" in both sexes (Platen *a 13*).

Female in albescent immature plumage. Head, crest and neck fulvous white with dark brown shaft-streaks; the upper parts display a varied plumage of sepia and fulvous brown, the feathers in general having dark centres and pale bases and margins; primaries and secondaries tipped with white; tail pale brown above, white below, and crossed with 5 to 6 indistinct dark bands, tip white; whole of under surface buffy white, streaked from the breast downwards with dark brown, which often spreads out in a washy manner in lighter brown over much of the feather. In this specimen the cross-barred feathers of maturity are sprouting at the flanks (S. Celebes — Nr. 6683).

A male in albescent plumage recently obtained by the Drs. Sarasin at Kema, Aug. 5th, 1893, corresponds with the above description of the female; ear-coverts and subocular region black; under surface purer white, with fewer and smaller brown streaks, here and on the upper surface not showing a general wash of rufous apparent on comparison in the other specimen. "Iris yellow; legs and feet yellowish grey; bill black, at the base blue" (Sarasin). A second male is much more rufous in general tint than the other (Macassar, 12. IX. 95: Sarasin Coll.).

A specimen in the Leyden Museum (N. Celebes — Faber, 1883) is half in albescent plumage, half in adult. Wings and tail as in albescent specimens; under wing-coverts white, some tipped with rufous brown; back, breast, abdomen and thighs much as in ♀ ad.

First plumage. The full-fledged young of this species is not known, but in the cases of *Spilornis bacha* (Java), *S. cheela* (India) and *S. spilogaster* (Ceylon), young birds of each in the first stage of dress have been described or figured (Schlegel, Valkv. N. I. pl. 22, f. 3; Sharpe, Cat. B. I, 287; Legge, B. Ceylon 1880, 62; Bernstein, J. f. O. 1860, 425), from which it will be seen that the first plumage often — perhaps always — much resembles that of full maturity. Whether young birds always assume this mature-looking dress on first leaving the nest, and then lose it and put on the immature albescent plumage, and finally recover the adult type of coloration, or, whether the members of the genus are dimorphous when young — both mature-plumaged and albescent individuals existing from the nest, — are questions upon which opinion is divided, and facts, unfortunately, are as yet insufficient to allow of their being answered. The albescent type of immature plumage probably occurs in all species of the genus. Specimens in this dress are figured by Schlegel in the cases of *S. bacha*, *S. rufipectus* and *S. sulaensis* (*b I*; *c I*; Schl., Valkv. pl. 22, f. 3); similar immature birds of *S. davisoni* Hume, *S. rutherfordi* Swinh. and *S. cheela* Lath. have been described (Hume, Str. F. II, 148; Bingham, ib. IX, 144; Oates, B. Brit. Burmah, II, 194; Sharpe, Cat. B. I, 287), and there is a ♀ specimen of *S. holospilus* Vigors from Mindanao in this plumage in the Dresden Museum (Nr. 13822). Gurney considered this to be the second plumage *(8)*, Schlegel and Colonel Legge express the opinion that it is a more or less frequent variation of

dress assumed in the nest itself. Longitudinal streaks on the feathers of birds appear to represent a more original, less highly differentiated plumage than do cross-bars; this is shown by the fact that almost all birds of prey, which when adult acquire a cross-barred under-side, have this region streaked or drop-marked when immature.

If Gurney's view, that the pale, streaked specimens of *Spilornis* are in the second plumage, be correct, the curious case would be seen of a species regularly reverting from a higher stage of dress to a lower one and, subsequently, re-acquiring the more highly differentiated coloration.

As pointing to the probability that both albescent, streaked individuals and also dark, spotted ones exist from the nest in the case of *Spilornis*, Colonel Legge points out that of the Booted Eagle *(Nisaetus pennatus)* both dark and light young ones have been taken out of the same nest; but the case is not strictly a parallel to that of *Spilornis*, inasmuch as *N. pennatus* has two different phases of adult dress, a light and a dark one, and, when dimorphous pairs of young ones have been found, they are said to be sprung from a light male and dark female, or vice-versa (B. Ceylon, 62).

The albescent plumage is found in both sexes.

Skeleton.

Length of cranium	77.5 mm	Length of fibula	84.0 mm
Greatest breadth of cranium	42.0 »	» » tarso-metatarsus	76.0 »
Length of humerus	97.0 »	» » sternum	61.0 »
» » ulna	110.0 »	Greatest breadth of sternum	35.5 »
» » radius	105.0 »	Height of crista sterni	13.5 »
» » manus	87.0 »	Length of pelvis	72.0 »
» » femur	65.0 »	Greatest breadth of pelvis	31.5 »
» » tibia	105.5 »		

(Siao, Sangi in Mus. Berol. XVII.)

Nidification. Unknown.

Distribution. Celebes. South Peninsula (Wallace *a 1*, Guillemard *a 14*, Platen *a 13*, Weber *a 17*, *etc.*); Central Celebes — Luwu Distr. (Weber *a 17*, P. & F. Sarasin *a 20*); S.E. Peninsula — Kendari (Beccari *a 7*); E. Peninsula (Nat. Coll. *a 21*); N. Peninsula (Forster *b 1*, v. Duivenbode *c 3*, *etc.*); Talissi Id. (Hickson *a 15*); Lembeh Id. (Nat. Coll. in Dresd. Mus.); Siao — known only from skeleton (Meyer *a XVI*).

2. Spilornis rufipectus sulaensis (Schl.).

d. **Circaetus sulaensis** *(1)* Schl., Valkv. Ned. Ind. 1866, 38, 72, pl. 23, figs. 4—6; *(2)* Gray, HL. 1869 I, 15.

e. **Spilornis sulaensis** *(1)* Wall. Ibis 1868, 16; *(2)* Sharpe, Cat. B. 1874, I, 292; *(3)* Gurney, Ibis 1878, 102; *(4)* id. Diurn. B. of Prey 1884, 17; *(5)* Sharpe, Ibis 1893, 552.

f. **Circaetus rufipectus sulaensis** *(1)* Schl., Mus. P.-B. Rev. Accip. 1873, 114.

Figures and descriptions. Schlegel *d I*; Sharpe *e 2*.

Diagnosis. Wing relatively shorter than in the *typical S. rufipectus* (see table); under-side of quills greyish white, passing into blackish at the distal ends, and crossed by three or four well-marked bars of blackish, much narrower than those of the typical form. These bars do not coalesce on the basal half of the quills in the same manner as in that form, but pass separately across the wing.

Distribution. Sula Islands, Sula Besi and Sula Mangoli (Allen *d 1*, Bernstein & Hoedt *c I*, *e 1*).

In the Leyden Museum are seven specimens — 3 ♂ ad., 3 ♀ ad. and 1 ♀ juv. albescent — from Sula. The males have the breast paler; on the lower breast and

abdomen the white bars are broader and the brown ones narrower, and the barring on the lower breast is better defined than in the other sex; under tail-coverts white (in one specimen slightly barred towards the tip). The females of Sula have the under tail-coverts barred and in regard to the barring of the under surface would appear to resemble the males of Celebes, but there are only one or two males with the sex satisfactorily ascertained in the Leyden Museum for comparison. The female of Celebes is more spotted below.

3. Spilornis rufipectus < sulaensis. [1])

g. **Spilornis sulaensis** *(1)* M. & Wg., Abh. Mus. Dresden 1896 no. 2, p. 7.

"Alaji Kabut", Peling; **"Alaji"**, Banggai, Nat. Coll.

Diagnosis. Intermediate between the *typical S. rufipectus* and *S. rufipectus sulaensis*, but on the whole more like the latter race.

Distribution. Peling group between Sula and E. Celebes: — Peling and Banggai (Nat. Coll.).

Measurements.	Wing	Tail	Tarsus	Culmen from cere
(Nr. 668[2]) [♀] North Celebes	370-5	250	79	28
(Nr. 2199) [♀] North Celebes	340-4	250	74	26
(*C* 846) [♀] N. Celebes, March 1871 (Meyer)	360	240	75	—
(*C* 10844) [♀] N. Celebes, Aug.—Sept. 92 (Nat. Coll.)	344	230	74	27
(*C* 10845) [♀] N. Celebes, Aug.—Sept. 92 (Nat. Coll.)	353	236	74	27.5
(Sarasin Coll.) ♂, N. Celebes, 20. Oct. 93 (P. & F. S.)	340	230	78	25.5
(Sarasin Coll.) ♂, N. Celebes, 6. Oct. 94 (P. & F. S.)	342	242	78	27
(Sarasin Coll.) ♂ juv., N. Celebes, 5. Aug. 93 (P. & F. S.)	337	230	73	27
(*C* 14247) [♂] Lembeh Id. March 95 (Nat. Coll.)	337	218	73	25
(*C* 10708) ♂, South Celebes, 6. May 78 (Platen)	330	215	75	28
(*C* 10707) ♂, South Celebes, 12. March 78 (Platen)	325	220	73	27.5
(Schlüter Coll.) ♀, South Celebes (Platen)	344	229	72	—
(Sarasin Coll.) ♂, South Celebes, 21. Sept. 95 (P. & F. S.)	322	223	74	29
(Sarasin Coll.) ♂ juv., S. Celebes, 12. Sept. 95 (P. & F. S.)	332	232	70	26
(Sarasin Coll.) ♀, Centr. C., Palopo, 21. Jan. 95 (P. & F. S.)	328	—	72	28
(*C* 14298) [♀], East Celebes, May-Aug. 95 (Nat. Coll.)	363	236	78	—
(Norwich Mus.) ad. Macassar (Wallace) (Communicated by Mr. Gurney:)	345	—	71	—
(Norwich Mus.) ♂ ad. Macassar (Wallace) (Communicated by Mr. Gurney:)	345	—	71	—
(Norwich Mus.) ♂ ad. Macassar (Wallace) (Communicated by Mr. Gurney:)	338	—	69	—
(Norwich Mus.) ad. Macassar (Wallace) (Communicated by Mr. Gurney:)	345	—	76	—
(Norwich Mus.) imm. N. Celebes (Meyer) (Communicated by Mr. Gurney:)	345	—	71	—
(Norwich Mus.) vix ad. N. Celebes (Whitely) (Communicated by Mr. Gurney:)	355	—	76	—
5 adults, Peling Id., V—VIII. 95 (Nat. Coll.)	312-38	—	—	—
4 adults, 2 juv. Banggai Id., VI. 95 (Nat. Coll.)	305-25	—	—	—
(Norwich Mus.) ♂, Sula Islands	314	221	73	27
(Norwich Mus.) ♀ juv., Sula Islands	305	220	72	26

[1]) As will be found more fully explained under the *heading: Haliastur indus*, a long connecting hyphen (*e. g. S. rufipectus — sulaensis*) is used in this work to indicate the connecting forms between subspecies; or, where it may be safely said that such individuals have stronger leanings to one subspecies than to the other, the sign > or <, respectively (*S. rufipectus > sulaensis*) indicating that the affinities are more with the typical form, or (*S. rufipectus < sulaensis*) with the latter form.

The fine series of this Serpent-harrier before us displays great variation in tint; on the breast, for instance, from pale russet to dark Vandyck-brown. The darkest examples are probably the oldest. The specimens from North Celebes are, with one exception, darker than those of the southern peninsula, and Mr. Gurney writes that the specimen from Kema (N. Celebes) in the Norwich Museum "is decidedly darker than our four from Macassar, especially on the breast". Two in the Leyden Museum from Pare-Pare near Macassar do not appear to differ from those of the north, and Mr. Hartert remarks *(a 22)* of some fresh specimens from the southern peninsula in the Tring Museum that the breast is much paler in some examples, darker in others. None of the southern examples before us appear to be old birds. The birds from Peling and Banggai vary in the same way, — one is Vandyck-brown on the breast, most of the others much paler.

Outside the Celebes Province a very near ally of *S. rufipectus* is found in Dr. Sharpe's recently described *Spilornis raja* (Bull. B. O. C. 1893, no. X; Ibis 1893, 552, 569), a specimen of which was sent by Mr. Edward Bartlett from Kuching, Sarawak. This is said to be most like the Sula race, but differs in having the white bars of the breast, abdomen and axillaries strikingly narrower. From Sharpe's measurements it would appear to have the wing of the Sula form (viz. 309 mm), but a shorter tail (178 mm).

The food of Serpent-harriers consists chiefly of frogs, snakes and other Reptilia. The Indian species lay one or two eggs; most usually only one.

The genus *Spilornis* is an important one in questions of geographical distribution. Owing to the small number of eggs laid, the species do not suffer from overcrowding; and there appear to be no causes for its ever shifting its quarters. The genus is a purely Indian one, and is not found further east than the Sula Islands; and the close connection of these islands with Celebes is shown by the fact of their possessing the same species, which also — if identical — occurs on Siao in the Sangi Islands.

Attention might here be called to the close similarity of the plumage of *Circus assimilis* Jard. & Selby to certain species of this genus, especially *Spilornis holospilus* Vig. of the Philippines.[1]) Mimicry is here out of the question, as *C. assimilis* does not occur in the Philippines, and the similarity must be taken as pointing to kinship of the two genera (see below under *Circus assimilis* and *Pernis celebensis*).

GENUS CIRCUS Lac.

The Harriers are of slender form, with very long wings, tail, and tarsus, and somewhat short and not powerful toes. A more or less well developed facial ruff extending from behind the ear-coverts across the throat:

[1]) Cf. also *Spilornis panayensis* Steere (List B. Philip. Is. 1890 p. 7).

bill somewhat weak, with a blunt festoon: tarsi naked (except at the top anteriorly), clad in front with transverse shields, elsewhere with small reticulate scales. Food: amphibians, reptiles, small mammals, etc. Eggs 2—4 in number. About 18 species, migratory and stationary, distributed over the greater part of the world.

2. CIRCUS ASSIMILIS Jard. Selby.

Allied Harrier.

Circus assimilis *(1)* Jard. & Selby, Ill. Orn. 1826, I, pl. 51 type examd.[1]); *(2)* Schl., Mus. P.-B. Circi, 1862, 9; *(III)* id., Valkv. 1866, 29, 66, pl. 20, f. 2, 3; *(4)* Walden, Tr. Z. S. 1872, VIII, 37; *(5)* Sharpe, Cat. B. 1874, I, 63; *(6)* Gurney, Ibis, 1875, 225; *(7)* id., Diurn. B. of Prey, 1884, 23; *(8)* W. Blas., Ztschr. Ges. Orn. 1885, 205, 234; *(9)* North, Nests & Eggs B. Austr. 1889, 1, pl. II, f. 4 (egg); *(10)* Büttik., Webers Reise in Ost-Ind. 1893 III, 272; *(11)* M. & Wg., Abh. Mus. Dresden 1896 no. 1, p. 7; *(12)* Hartert, Nov. Zool. 1896, 163.

a. **Circus jardinii** Gld., P. Z. S. 1837, 141; *(1)* id., B. Austr. 1848, I, pl. 27; *(2)* S. Müll., Reizen Ind. Arch. 1857, II, 8; *(3)* Gld., Handb. B. Austr. 1865, I, 60; *(4)* Schl., Rev. Acc. 1873, 50.

b. **Spilocircus jardinii** *(1)* Kaup, Isis, 1847, 102.

c. **Strigiceps jardinii** *(1)* Bp., Consp. 1850, I, 34.

"Bokan buri", S. Celebes, Platen *8.*

For further references see Sharpe *5.*

Figures and descriptions. Jardine & Selby *I*; Gould *a I*, *a 3*; Schlegel *III*; North *9* (egg); Kaup *b I*; Sharpe *5*; W. Blas. *8.*

Male, nearly adult. General colour above brownish ash, darker on head; forehead, ear-coverts and crown with rufous margins to the feathers; secondaries pure ashy, banded with dark brown — indistinctly on the inner web; wing-coverts, scapulars and upper tail-coverts marked with short bars or large spots of white, which are more indistinct and ashy on exposed parts of the plumage; shoulder rufous; tail above ashy, below white, crossed with seven bars of blackish and terminally margined with white; under surface — including under wing- and tail-coverts and thighs — cinnamon-rufous, lighter on the thighs and abdomen, and spangled all over with white spots arranged two and two at short intervals on the opposite webs of the feathers. "Iris sulphur-yellow; cere and bill bluish grey (cere pale yellow — Wallace); tip of bill black; feet citron-yellow" (Platen). Nr. 6735, Tjamba, May).

Old. Crown of head, cheeks and ear-coverts tawny-rufous, with blackish mesial streaks to the feathers (♂, Lake Posso, 14. Feb. 95, P. & F. Sarasin).

Female. Like the male, but larger.

Young. Above brown with fulvous margins to the feathers; upper tail-coverts white washed with rufous and having dark brown centres; tail sepia-brown tipped with

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[1]) The type of *Circus assimilis J. & S.* in the British Museum is immature and not normal, differing from all other specimens there of this species in the coloration of the wings and tail. The tail is nearly uniform brownish ashy with a rufous wash at its sides, marked with 3 or 4 imperfect bars of brown towards the base, followed by a clear space, with an imperfect terminal bar. Upper tail-coverts white, a few of the longer ones with a bar of brown towards the tip.

tawny-buff and crossed with six bands of black; below pale tawny-buff, lightest on abdomen and thighs, and streaked with dark brown on breast and under tail-coverts (ex Sharpe).

Eggs. 2 or 3, white, with a bluish green tinge on the inner surface; 51—52 × 38—39 mm (Australia — A. J. North *9*). Uniform white, a little smaller than those of *C. rufus* of Europe: 49—51 × 39—39 mm: Nehrkorn, MS.).

Nest. Flat, of small sticks and twigs, lined with green leaves; usually placed among the thick branches of a low tree (Australia).

Breeding-time in Australia. Sept.—Nov.

Measurements.	Wing	Tail	Tarsus	Culmen from cere
a. (Sarasin Coll.) ♂ ad. Lake Posso, Central Celebes, 14. II. 95 (P. & F. S.)	375	235	84	20
b. (C 10709) ♂ vix ad. S. Celebes, 16. IV. 78 (Platen)	390	260	93	19
c. (C 10710) ♀ vix ad. S. Celebes, 25. V. 78 (Platen)	425	275	98	20.5
d. (Nr. 6735) ♂, S. Celebes, 6. V. 78 (Platen)	385	250	93	—
e. (C 11293) [♀] New South Wales	435	280	101	21
f. (C 11092) [♀] juv. Australia	437	280	107	22

Distribution. N. Celebes—Minahassa (Riedel *b 4*), Gorontalo District (Forsten *2*, Rosenberg *b 4*), Central Celebes (P. & F. Sarasin *11*), S. Celebes (S. Müller *2*, *b 2*, Weber *10*, Platen *8*, Everett *12*); Australia—apparently throughout (Ramsay *9*); Tasmania (Norwich Mus. *6*).

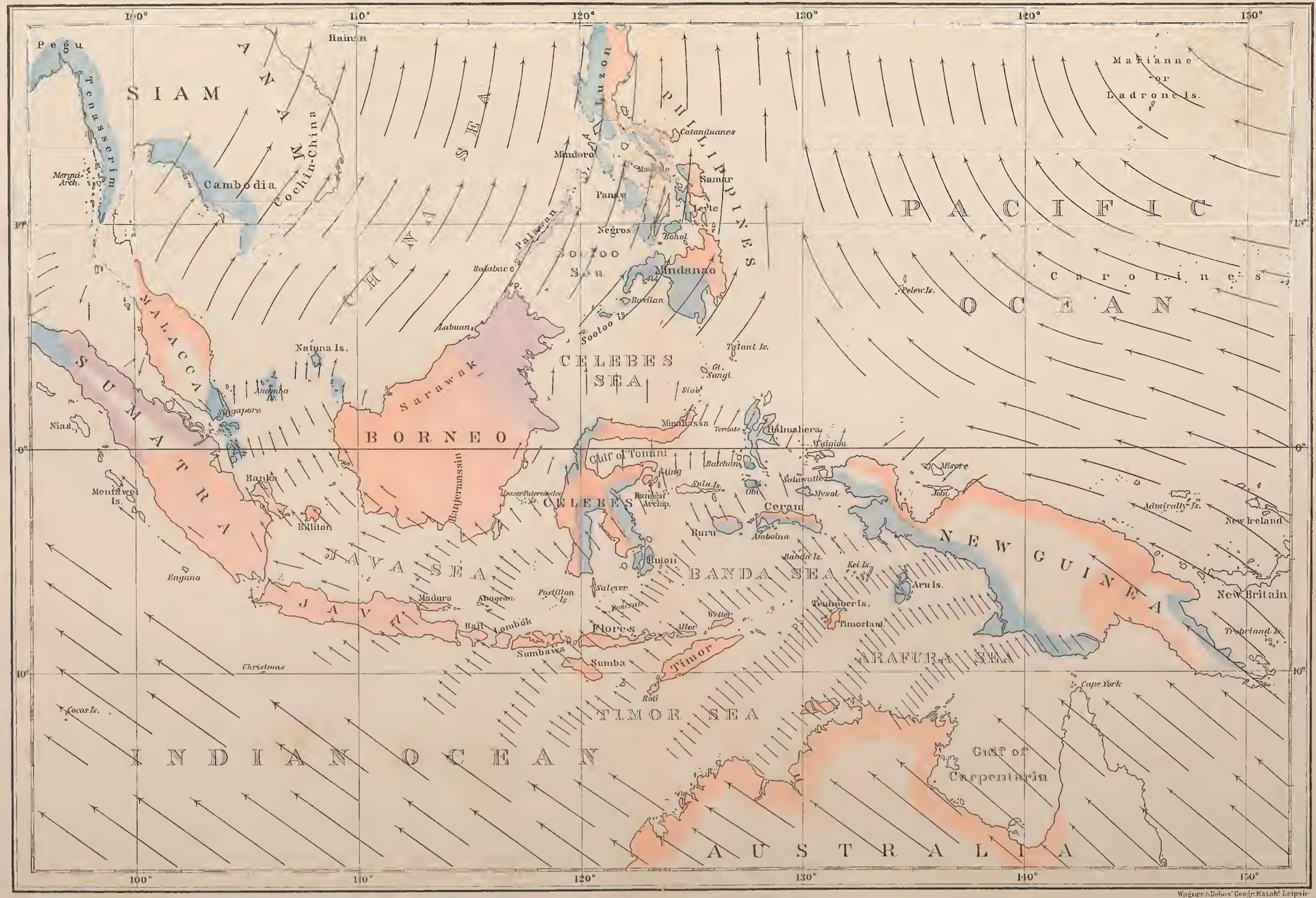
This well-marked Harrier is remarkable for its distribution, occurring, as it does, in Celebes and Australia and, so far as is yet known, on none of the intervening islands. To the north and west of Celebes, the Chinese *Circus spilonotus* Kaup is found in the Philippines and Borneo, and, according to Mr. Everett and Mr. Whitehead (J. Straits Br. R. A. S. 1889, 180; Ibis, 1890, 43), this species is "a regular winter migrant" to Borneo and Palawan. East of Celebes, a Harrier (*C. spilothorax*, Salvad. & D'Alb.) has been discovered at Yule Island in the Papuan Gulf, South New Guinea, corresponding closely in coloration with *C. maillardi* Verr. (*C. macrocelis* Newton) of Madagascar and Réunion and with *C. wolfi* Gurney and *C. gouldi* Bp. of New Caledonia and Australia, respectively (Salvad., Orn. Pap. I, 71); but neither this species, nor *C. spilonotus*, have anything to do with *C. assimilis*.

The similarity of the adult plumage of this Harrier to that of certain species of *Spilornis* is worthy of notice. The type of coloration may be ancient. It should be remarked that Gurney, whose arrangement of the *Falconidae* we follow, places the subfamily *Circinae* much nearer to the *Circaetinae* (containing *Spilornis*) than has been the custom with most other authors *(7)*.

C. assimilis is, we believe, a stationary species in Celebes, though we have only been able to collect the following few dates of occurrence there ranging from February to November:

Winds and Rains: April - September

Meyer & Wiglesworth: Birds of Celebes — *Map III*

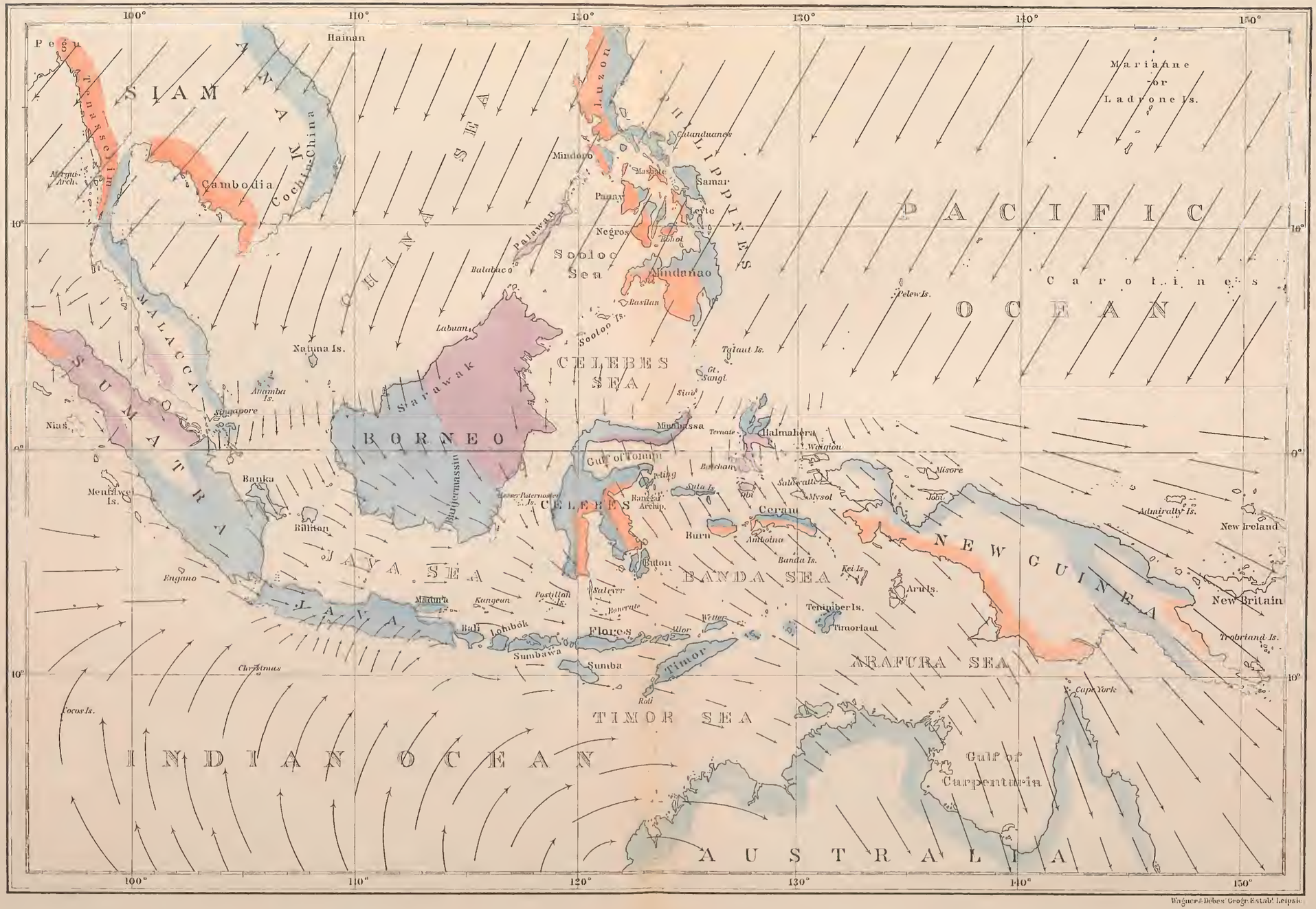


Fine season *Rainy season* *Variable*

Winds and Rains: October - March

Meyer & Wiglesworth: Birds of Celebes

Map IV



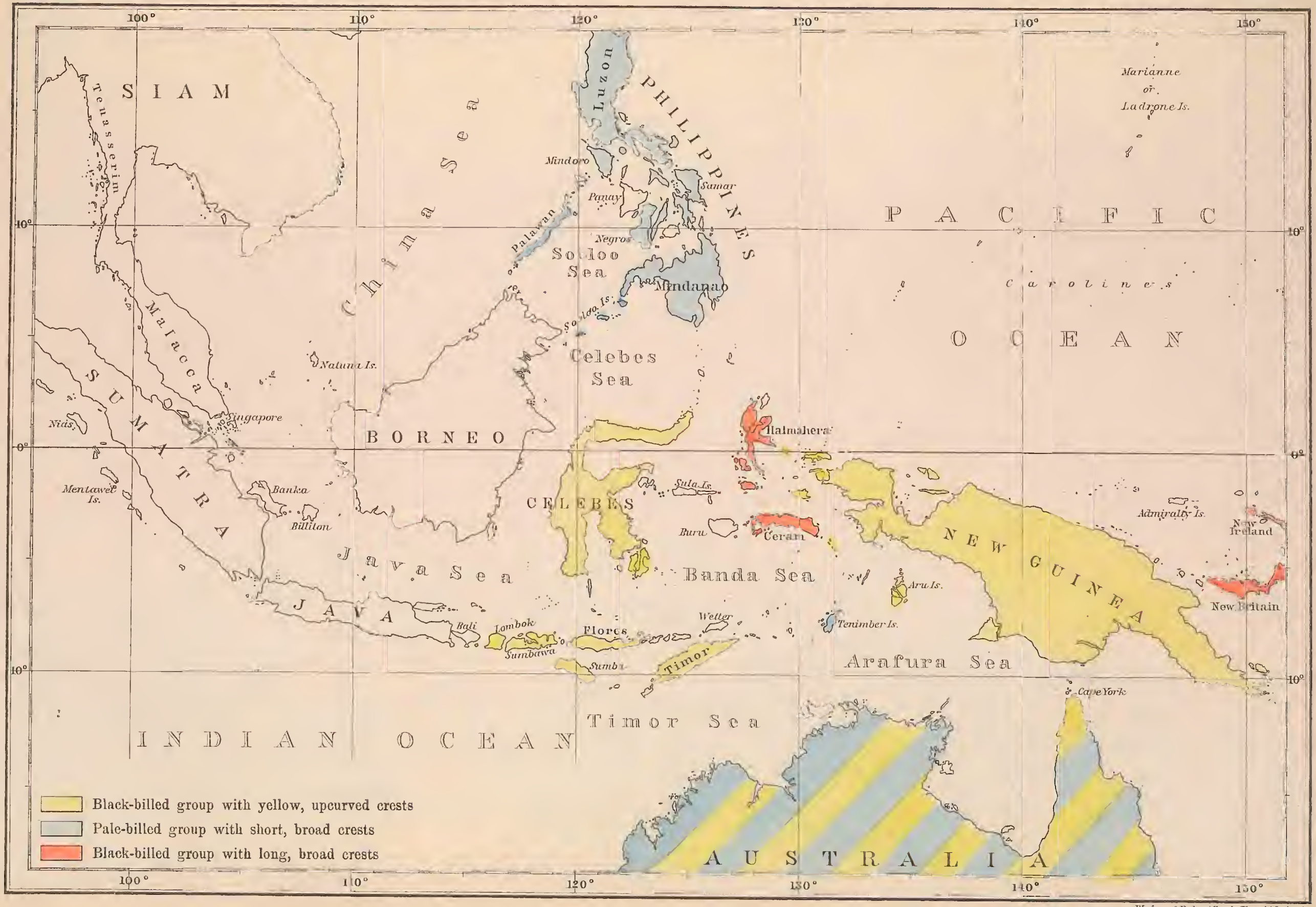
Wagner & Debes' Geogr. Estab. Leipsic

Fine season *Rainy season* *Variable*

Distribution of the genus Cacatua

Meyer & Wiglesworth: Birds of Celebes

Map V



Wagner & Debes' Geogr. Estab.t Leipsic.

Distribution of the genus Loriculus

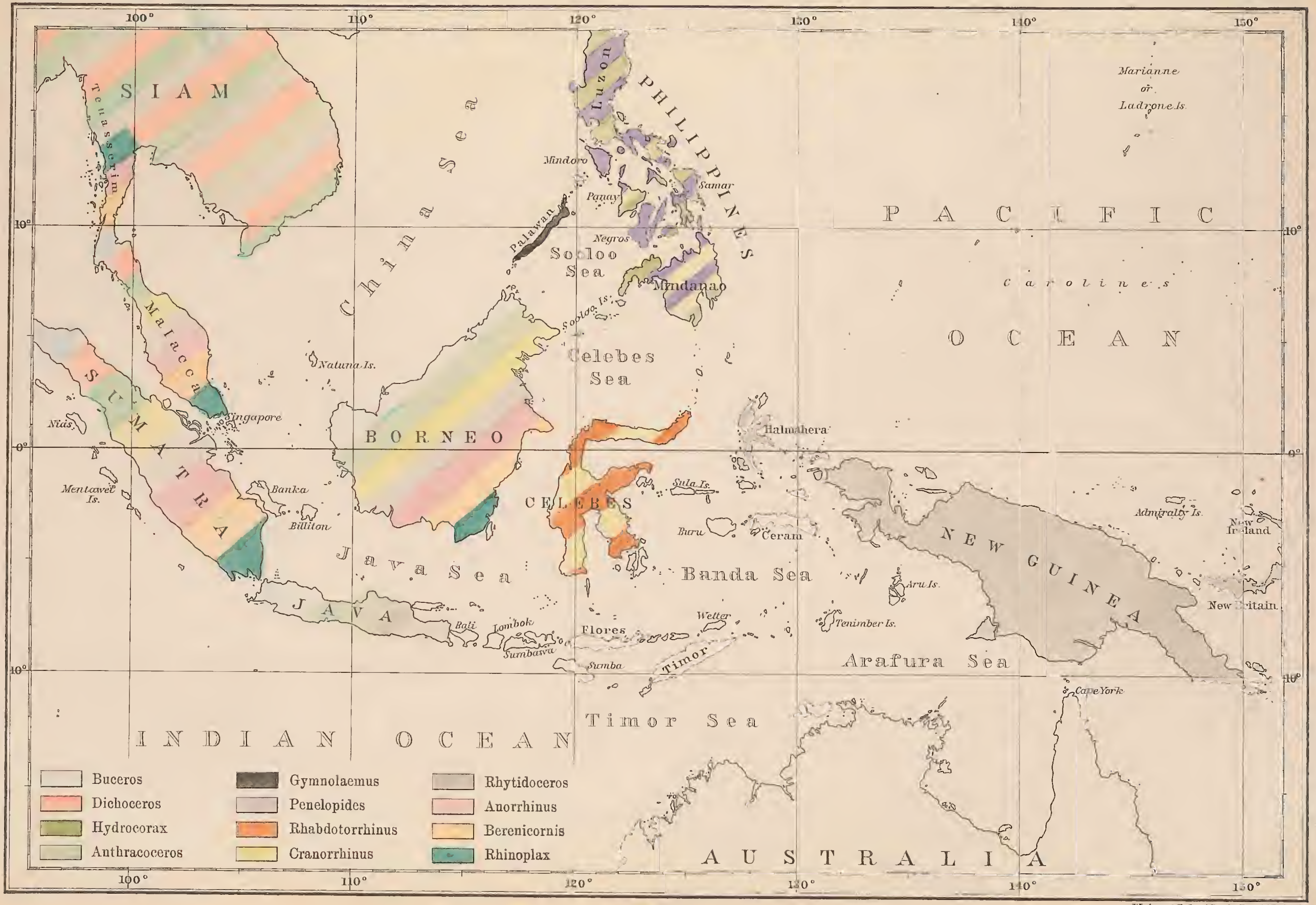
Meyer & Wiglesworth: Birds of Celebes — *Map VI*

Wagner & Debes' Geogr. Estab. Leipsic.

1. Loriculus vernalis. (2. L. indicus, not on map). 3. L. galgulus. 4. L. pusillus. 5. L. flosculus. 6. L. philippensis. 7. L. regulus. 8. L. worcesteri. 9. L. chrysonotus. 10. L. mindorensis. 11. L. siquijorensis. 12. L. apicalis. 13. L. bonapartei. 14. L. catamene. 15. L. exilis. 16. L. stigmatus. 17. L. quadricolor. 18. L. sclateri. 19. L. sclateri ruber. 20. L. amabilis. 21. L. aurantiifrons. 22. L. aurantiifrons meeki. 23. L. tener.

Distribution of the Bucerotidae

Meyer & Wiglesworth: Birds of Celebes — *Map VII*



Wagner & Debes' Geogr. Estabt. Leipsic.

$^{2}/_{3}$

Spilospizias trinotatus (Bp.)

imm.

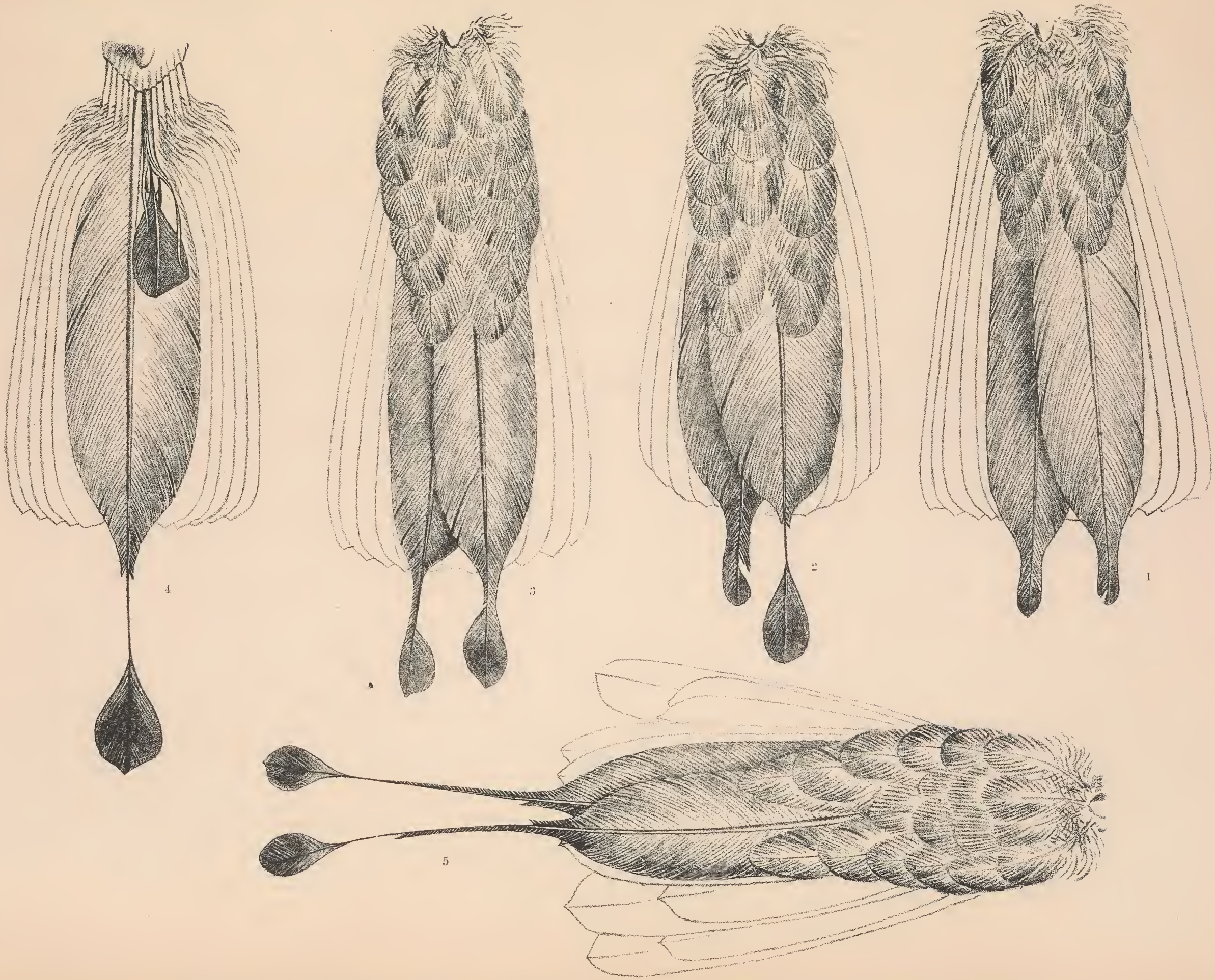
Spizaetus lanceolatus Temm. & Schl.
ad.

Pernis celebensis (Wall.)
ad.

Spizaetus lanceolatus Temm. & Schl.
juv.

Pernis celebensis (Wall.)
juv.

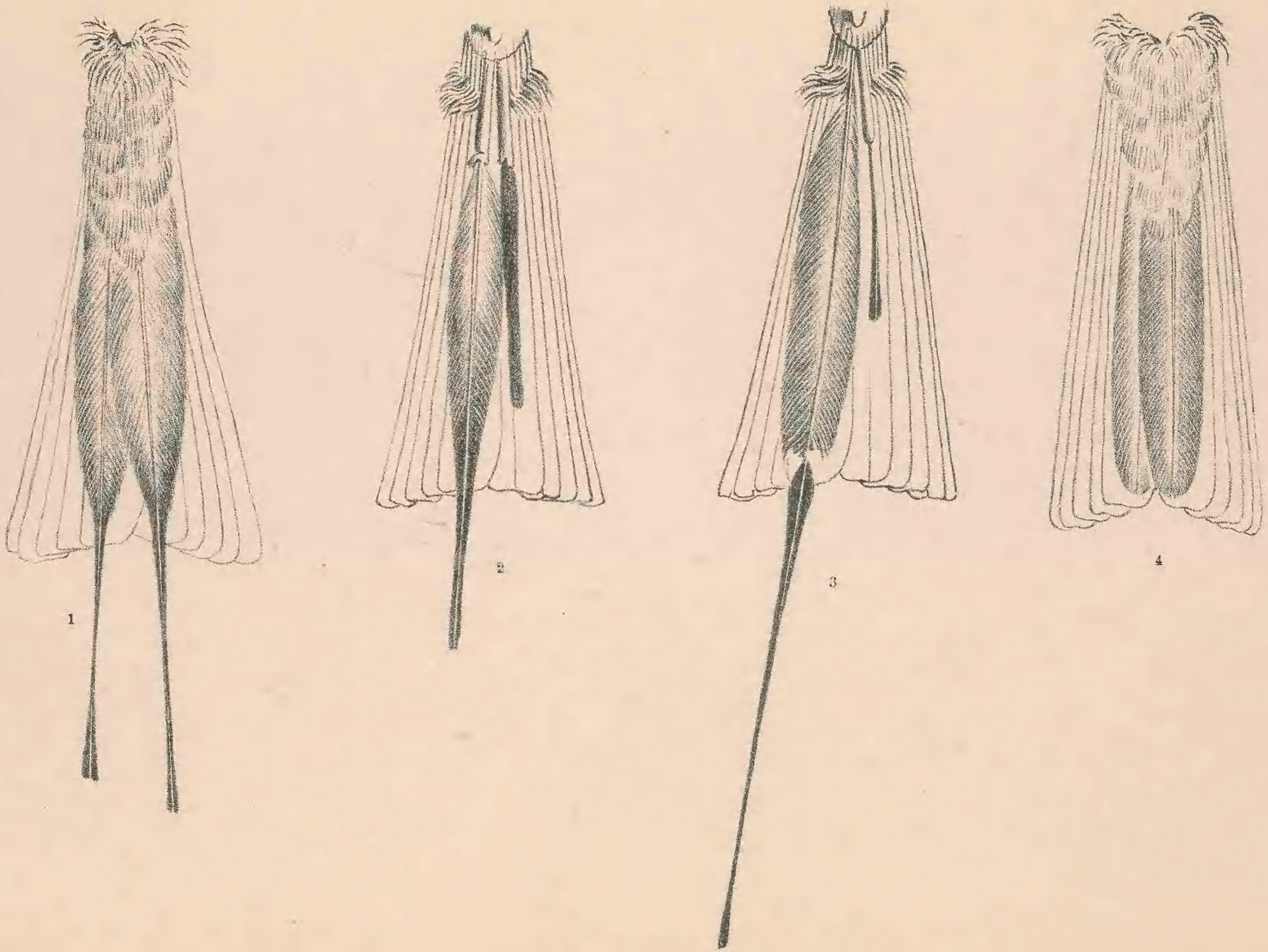
Ninox ochracea (Schl.)
ad. et juv.



Prioniturus platurus (*Vieill.*) · *1. mas juv., 2. imm., 3. mas imm., 4. fem. ad. moulting, 5. mas ad.*

1.–3. Prioniturus flavicans Cass. 1. fem. ad., 2.-3. mas moulting *4. Prioniturus platurus (Vieill.), mas ad.*

Aprosmictus sulaensis Rchw.



1., 3–4. Merops ornatus Lath., 1. ad. perfect, 3. ad. moulting, 4. juv. perfect. 2. Merops philippinus L., ad. moulting.

Pelargopsis dichrorhyncha M. & Wg.
Monachalcyon capucinus M. & Wg.

1. Ceycopsis fallax (Schl.) *2.–3. C. sangirensis M. & Wg., 2. ad., 3. juv.*

Caprimulgus celebensis Grant
Lyncornis macropterus Bp.

Chaetura celebensis (*Sclat.*)
fem. juv. & mas.

Muscicapula hyperythra (*Blyth*)

mas, fem. et juv.

1. Siphia banyumas (Horsf.)
2. Siphia djampeana Hart.
3. Siphia kalaoensis Hart.

Stoparola septentrionalis Bütt.

mas, fem. et juv.

1. Monarcha commutatus Brügg. 2.–3. Zeocephus talautensis M. & Wg., 3. ad. et 2. juv.

Monarcha everetti Hart.
Pachycephala teijsmanni Bütt.
Pachycephala everetti Hart.

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