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# Handbook of New Guinea Birds

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## IN MEMORIAM

While the manuscript of this volume was in the editor's hands, E. Thomas Gilliard, in his 53rd year, died of a heart attack in New York, 27 January 1965

# Index of Scientific and Popular Names

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# Handbook of New Guinea Birds

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Illustrations by Douglas E. Tibbitts and Albert E. Gilbert

# Introduction

This volume is a guide to the identification of New Guinea birds with a synopsis of what we know about them. It is hoped that it will further the study of these birds by those who live in or visit New Guinea, and will make available at least a superficial knowledge of the wonderfully rich avifauna of this remarkable subregion to bird-conscious people throughout the world. As preparation for this work the two authors between them have spent more than six years studying and collecting birds in New Guinea and an even longer period in museum study of the subject.

This volume makes no pretence to being a 'field guide' in the modern sense. There are no experts in field identification in this area and resident naturalists are few and scattered. Rather, and of necessity, our plan is more along the lines of Frank M. Chapman's *Handbook of Birds of Eastern North America*, first published in 1895, which, while designed primarily as a tool for the identification of the bird in hand, serves very well as a field guide to the naturalist equipped with binoculars. The knowledge of the lives of New Guinea birds is not, however, equal to that of the lives of the birds in the United States in 1895 and there is still a good deal of basic description of habitats, habits and plumages left for the future field worker.

There are three great landmarks in Papuan ornithology: Tommaso Salvadori's three-volume work *Ornithologia della Papuasia e delle Molucche*, published in 1880–2, the reports of the Archbold Expeditions 1932–40, and Ernst Mayr's *List of New Guinea Birds*, published in 1941. It is difficult to pick from the hundreds of contributions to Papuan ornithology a few most worthy of special mention. Walter Rothschild and Ernest Hartert did much to encourage exploration in New Guinea in the first half of the present century and their taxonomic studies, along with those of Erwin Stresemann and Ernst Mayr, did much to establish the modern sound taxonomic and nomenclatural basis on which New Guinea ornithology now rests.

This firm foundation has encouraged us to prepare the present volume as the first step in making the knowledge of New Guinea birds,

hitherto confined to a few professional ornithologists, available to a larger public; general biologists, naturalists and students, and the rapidly increasing number of people interested in wild life generally. Its success will perhaps be indicated by the quickness with which a better one is produced to supersede this first effort.

## Acknowledgements

We owe a debt of gratitude to a great many people who made this first book possible, persons so numerous that most of them must be thanked in bloc. There are the many collectors and authors upon whose work we have built. One who must be singled out for special thanks, however, is Dr Ernst Mayr with whom we both worked for a time in The American Museum of Natural History, and whose 1941 'List of New Guinea Birds' is still our standard list.

For our own field work in New Guinea there are the many administrators, missionaries, and private individuals, museum officers and fellow field workers who aided us in travel, in collecting, and for encouragement, support and hospitality as we have recorded in the reports on our separate expeditions.

Unpublished information on New Guinea birds was generously provided by Dr Ralph Bulmer of Auckland University and Dr S. Dillon Ripley, then of Yale University, from their work on the Papuan avifauna. We have also had available the resources, the facilities and the support of the institutions with which we are associated, the Field Museum of Natural History in Chicago, and The American Museum of Natural History, New York. To our associates in these institutions, especially to Dr E. R. Blake and Mr M. A. Traylor of the Field Museum and Dr Dean Amadon of the American Museum to whom we have turned for criticism and advice, freely given.

For financial support in preparing the illustrations in this volume we are indebted to Mr Richard Archbold of Archbold Expeditions, The American Museum, and for a subsidy, making possible the publication of this volume, the Frank M. Chapman Memorial Fund of The American Museum of Natural History.

Our thanks are also due to the artists, Mr Douglas E. Tibbitts, Chicago, and Mr. Albert E. Gilbert then of Chicago. For patient, painstaking care in preparing the copy, we are indebted to Mrs Wanda Harrison, Chicago.

# Plan of Work

Pages 5–7 contain a synopsis of the various orders of birds represented, and seventy-six black and white illustrations and five colour plates of birds have been selected to show the major types in New Guinea. One should read the synopsis and refer to the pictures to become acquainted with the different types and the groups to which they belong. The main part of the book then follows; the birds are systematically arranged with order and family grouping indicated. Under each group heading is a brief synopsis with, where necessary, a key for identification. Each species account starts with the scientific species name and where this differs from that used in Mayr's *List of New Guinea Birds*, Mayr's name is also given.

A vernacular (English) name is provided for each species. These are almost all 'manufactured' for most of these birds have no current English name, and we have tried to use a name that is descriptive or will recall an outstanding aspect of the species concerned. The length in inches then follows. This is taken from well-made specimens and is at best an approximation. The description is synoptic but, we hope, is adequate for identification. Description of immature plumages is not included.

The measurements of wing (flattened against a ruler), tail (measured from the insertion of the central tail-feathers), culmen (from base unless otherwise specified), and tarsus are taken from a selected specimen to give not only size but relative proportions. When geographical variations increase the range of size variation of a species, extremes are given in parentheses. In any case, individual variation in size gives a range in measurements which may be ten per cent of that given, and females and immatures are often smaller. The range is that of the species in general terms.

The subspecies in New Guinea are listed, range is given briefly, and where practical, some diagnostic character is also included. It is not

usually possible to identify down to subspecies without specimens in the hand for comparison.

Breeding data are given for New Guinea when possible. Extra-limital data are sometimes used, but in such cases they are included in square brackets with the area where recorded indicated. Under remarks we have tried to include a word sketch of the bird's way of life.

For general measurements feet and inches are used. For measurement of bird's wings, tail, feet and bill, millimetres are used, and usually abbreviated to 'mm'. To converting from one to the other, one inch is equal to about 25 millimetres.

The use of parentheses around the authorities for scientific names in this book is an editorial policy. It does not accord with the common convention in the scientific community in which such parentheses are used to indicate that the species is now placed in a genus other than that in which it was described, a practice of doubtful value.

# Synopsis of Orders

*Applicable to New Guinea Species only*

**Order 1** **Casuariiformes** Cassowaries

Three species; the only very large (weight up to one hundred pounds or more), flightless, terrestrial birds; wing quills reduced to naked shafts; figure 1; fol. p. 150

**Order 2** **Podicipediformes** Grebes

Two species; length 10 inches; swimming and diving, duck-like birds of lakes and ponds but with pointed bills and lobed (not webbed) toes; figure 2; fol. p. 150

**Order 3** **Procellariiformes** Albratrosses, Petrels, etc.

Sea birds; length 6–53 inches; when in New Guinea waters living off-shore, flying low over water; nostrils opening in tubes; bill long, hooked at tip; three front toes webbed, hind toe absent or very small; tarsus covered with small scales; few New Guinea records.

**Order 4** **Pelecaniformes** Pelicans and their allies

Six families; large water birds 15–72 inches long; of fresh or salt water; of various appearances and habits but all with four toes connected by webs, complete or partial. The six types of birds are shown by the figures: tropic bird, figure 4; pelican, figure 3; booby, figure 4; cormorants, figure 3; anhinga, figure 3; frigate bird, figure 4; fol. p. 150

**Order 5** **Ciconiiformes** Herons and their allies

Three families; length 11–60 inches; long necked, long legged, long-billed wading birds; toes four, all on same level; the three different types are shown by the figures: heron, figure 5; stork, figure 6; ibis, figure 7; fol. p. 150

**Order 6** **Anseriformes** Ducks, Geese, etc.
Eleven species; length 13–35 inches; swimming water birds, usually of fresh water, with short legs; three front toes webbed; bill flattened, blunt, and broad, with sieve-like arrangement of lamellae on edges; figure 8; fol. p. 150

**Order 7** **Falconiformes** Hawks, etc.
Twenty-nine species; perching and flying birds 10–39 inches long; with short, hooked bill and strong, grasping feet with sharp curved claws for seizing animal prey; figures 9, 10; fol. p. 150

**Order 8** **Galliformes** Quails, Megapodes, etc.
Two families; length 4 to 24 inches; walking birds with moderate legs and four toes; rather short and stout; for two types see megapodes, figure 11, and quail, figure 12; fol. p. 150

**Order 9** **Gruiformes** Cranes, Rails, etc.
Four families; length 4 to 49 inches; walking birds of marsh vegetation and open grass, with types illustrated by bustard quail (one species), figure 13; crane (one species), figure 14; rails (two species), figures 15, 16; bustard, figure 17; fol. p. 150

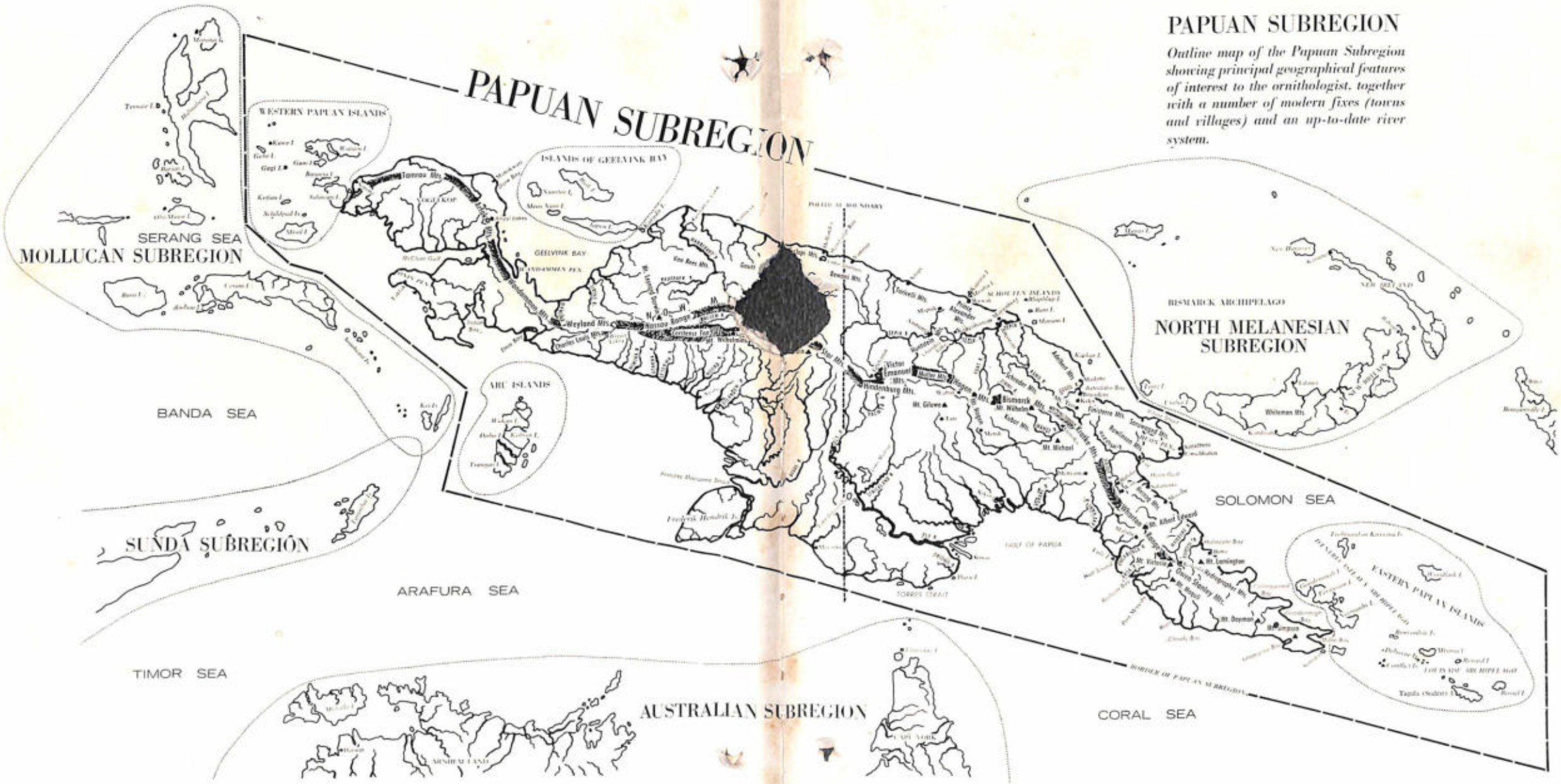
**Order 10** **Charadriiformes** Plovers, etc.
Nine families; length 5–25 inches; walking and flying birds of coastal waters, of beaches and mudflats, and marshes; the types are illustrated by jacana (one species), figure 18; oystercatcher, figure 19; plover and sandpiper, figures 20, 21; thick-knee or stone-curlew, figure 22; pratincole, figure 23; tern, figure 24; fol. p. 150

**Order 11** **Columbiformes** Pigeons and Doves
Forty-four species; 5–31 inches long; bill straight, rather slender and with nostrils opening in soft skin at base of bill; fruit and seed eating birds living in trees or on the ground; outline distinctive; see figures 25, 26, 27, and colour plate 1; fol. p. 150 and p. 83

**Order 12** **Psittaciformes** Parrots, Lories, etc.
Forty-six species; length 3–15 inches; bill short, stout and hooked; legs short and two toes in front, two behind, or one opposable; a very distinct group of seed and fruit eating tree birds; see figures 28, 29, 30, and plate 1; fol. p. 150 and p. 83

# PAPUAN SUBREGION

*Outline map of the Papuan Subregion showing principal geographical features of interest to the ornithologist, together with a number of modern fixes (towns and villages) and an up-to-date river system.*



**Order 13** **Cuculiformes** Cuckoos, etc.
Twenty-one species; length 5½ to 27 inches; legs rather short to moderate, two toes in front, two behind; bill slightly down-curved, moderate to rather long and heavy; birds of trees and shrubbery, feeding mostly on insects; see figures 31, 32, 33; fol. p. 150

**Order 14** **Strigiformes** Owls and Barn Owls
Ten species, two families; length 10–20 inches; eyes surrounded by feather disks; bill short and hooked; feet with sharp, curved claws for grasping live prey; figure 34; fol. p. 150

**Order 15** **Caprimulgiformes** Nightjars, Frogmouths, etc.
Thirteen species, three families; length 7–21 inches; plumage with complicated patterns of brown, etc.; feet very small; horny part of bill small but gape wide; see figures 35, 36, 37; fol. p. 150

**Order 16** **Apodiformes** Swifts and Crested Swifts
Eight species in two families; length 3½–12 inches; feet very small; horny part of bill small but gape wide; wings very long and narrow; colour black to greyish; sometimes with areas of white; feed on the wing on insects (compare with swallows); see figures 38, 39; fol. p. 150

**Order 17** **Coraciiformes** Rollers and allies
Four families; species length 4–36 inches; tree birds with short legs and small feet, two or three toes in front, the middle and outer fused for much of their length; bill rather stout to moderate and slender or long and bulky; types illustrated by kingfishers, figure 40, plates 1 and 2; bee-eater, figure 41; roller, figure 42; hornbill, figure 43; fol. p. 150 and p. 134

**Order 18** **Passeriformes** Perching birds or passerine birds
Twenty-nine families; species length 3–22 inches; most of the small birds living in trees, shrubbery and grasses belong to this group and some live on the forest floor; bill, legs, wing, and tail various, but toes four, all on same level, with hind toe and claw well developed; see figures 44–76, and plates 3, 4, and 5; fol. pp. 150, 262, 330 and 518

ZOOLOGICAL GARDENS CALCUTTA 1262(M)

# General Information

## The Papuan Area

The area covered by this work is the Papuan subregion of the Australian region. The island of New Guinea itself comprises most of the land surface of the subregion, but also included are its fringing islands (Daru, Manam, Karkar, etc.) and its satellite islands which are conveniently grouped as (a) western Papuan islands (Waigeu, Misol, etc.), (b) Aru islands, (c) islands of Geelvink Bay (Japen, Biak, etc.), and (d) eastern Papuan islands (D'Entrecasteaux and Louisiade Archipelagos, Trobiand islands, etc.). To the west of the Papuan subregion lie the Moluccas which include Halmahera, Ceram, Southeast and Kei islands; to the south is Australia with its fringing islands in Torres Strait; to the east and north is the Bismarck Archipelago (the islands of New Britain, Rook, Long, etc.) and beyond them are the Solomon Islands; while to the north lie the far distant Caroline Islands of Micronesia.

New Guinea itself, the second largest island (after Greenland) in the world, is an elongated mountainous island lying just south of the equator between latitude 0°19′ S. and 10°43′ S., and longitude 130°45′ E. and 150°48′ E. It is about 1,490 miles at its longest, 410 miles at its widest, with an area of 312,329 square miles, with one and three-quarter million people.

The main topographical feature of New Guinea is the central backbone of mountain ranges varying in width from 25 to 175 miles which are highest in the Snow Mountains (Orange and Nassau ranges), many of which rise above 12,000 ft and culminate in the snow-covered peaks of Mount Carstensz (16,500 ft), Mount Idenburg (15,800 ft), and Mount Wilhelmina (15,500 ft), but extend to each end of the island with only a brief gap in their continuity in the isthmus south of Geelvink Bay. Also important are the great swampy plains of the Fly and the Digul Rivers of south New Guinea and those of the Sepik and the

Mamberamo Rivers in the north. There are a few low ranges along the north coast such as the Cyclops and Adelbert Mountains but the Huon Peninsula Mountains are the only isolated high mountains. There are a few mountain lakes: Wissel Lakes, Lake Tamur, Lake Habbema, Anggi Lakes, located 4,000 to 12,000 ft above sea level. There are also some large lowland lakes: Lake Chambri, 180 miles up the Sepik; Lakes Murray and Daviumbu; largest is probably Lake Rombebai in the marshy delta of the Mamberamo, some sixty square miles in area.

The vegetation of New Guinea is mostly evergreen forest: rain forest and swamp forest in the lowlands, various types of mountain forests higher including certain oak forests; forests of antarctic beeches (*Nothofagus*) and pines (*Podocarpus* and *Libocedrus*).

However, there are three types of grasslands: lowland grasslands such as the extensive savannas (tree-dotted grasslands) of south New Guinea and of the Port Moresby area and Goodenough Bay with lesser areas scattered along the northern lowlands to near Humboldt Bay and south of the Tamrau Range of the Vogelkop (perhaps mostly secondary); mid-mountain grasslands, perhaps most extensive in the Central Highlands and in the Balim Valley north of the Snow Mountains, but also scattered through all the mountains. These seem largely secondary in origin. Alpine grasslands above about 10,000 ft are extensive in the Snow Mountains and also occupy considerable areas in the high mountains of eastern New Guinea (Owen Stanley Ranges) and there are extensive areas scattered through the Central Highlands (Giluwe, Hagen, Wilhelm) and in the Huon Peninsula (the Saruwaged Mountains). Grass areas also occur in the marshes, particularly in the lowlands.

### The Bird Fauna

The Papuan subregion has a total of about 650 bird species recorded that can be broken down as follows: breeding land and fresh water species 568, sea birds 22, Palearctic migrants 37, migrants from Australia and New Zealand 22 species (Mayr, 1941). Though Australia is ten times as big as New Guinea, its total avifauna is about the same (651) with 37 breeding sea birds (only four of the twenty-two sea birds reaching New Guinea are known to breed there) and about 531 breeding land and fresh water birds. Only 191 breeding land and fresh water species are shared, thus the total species count for the Australo-Papuan region is 906. The importance of this region, ornithologically speaking, is suggested by the fact that only 750 species are known from North America, 1,100 from the Palearctic region, 1,750 from Africa, and 2,500 from tropical America. (Mayr and Serventy (1944) and Keast (1961), *Bull. Mus. Comp. Zool.* **123**.)

The avifauna of the Australo-Papuan region has many sharp differences compared with that of the Oriental region from which area, presumably, the ancestors of its land and fresh water birds came. The Australo-Papuan region lacks pheasants, trogons, barbets, woodpeckers, broadbills, bulbuls and true finches. It is, however, remarkably rich in pigeons, parrots, kingfishers, cuckoo shrikes, Old World flycatchers, flowerpeckers and waxbills. Counted among the fifty-six Australo-Papuan families are eleven which are nearly or quite Australo-Papuan in origin: cassowary and emu, megapodes, owlet frogmouths, lyrebirds, scrub birds, flowerpeckers, honey eaters, bell magpies, birds of paradise, and bower birds.

The difference between Australia and New Guinea (Papuan) bird faunas is in part an ecological one: New Guinea is a humid, tropical island with a well developed mountain fauna; Australia is predominately an arid temperate area. Many of the New Guinea species which occur in Australia do so only in the rain forest of north-eastern Australia; many of the Australian species which reach New Guinea do so only in the savanna country of south New Guinea.

A few groups of birds distinctive of the Oriental region reach New Guinea but not Australia, such as a hornbill, a crested swift, and a shrike.

Some notable New Guinea groups are those of the birds of paradise, forty-three species (four in Australia and one shared); cassowary, three species (one in Australia); while New Guinea is richer in pigeons, thirty-nine species (twenty-two in Australia); kingfishers, nineteen species (ten in Australia); flycatchers, forty-nine species (thirty in Australia).

Australia on the other hand has in addition to the emus and scrub birds many sea birds, not only of pan-tropical groups such as terns but also of groups characteristic of southern waters; penguins and petrels.

## Distribution

### LOCAL DISTRIBUTION OF BIRDS

Most New Guinea birds are forest species but there are marsh species, often of wider geographical distribution (with some endemics such as the rail *Megacrex* and the mannikins *Lonchura nevermanni* and *L. stygia*); species found by mountain streams (such as *Pomareopsis*), and mountain lakes and streams (*Salvadorina*); also grasslands (e.g., *Megalurus, Malurus, Cisticola, Synoicus*); and savannas (see below).

The satellite islands in general have smaller avifaunas than does the main island, though some have endemic species, notably Biak (e.g., *Otus beccarii, Monarcha brehmii,* etc.), but also Waigeu and Batanta (e.g., *Paradisaea rubra, Diphyllodes respublica*), Fergusson and Normanby (e.g., *Paradisaea decora*), and Tagula (e.g., *Meliphaga vicina*), while Aru Island

and south New Guinea share a few endemic species (e.g., *Tanysiptera hydrocharis, Dacelo tyro*).

A number of quite unrelated birds share a peculiar distribution, being restricted mostly to small fringing islands (e.g., *Monarcha cinerascens*, which is also occasionally on the New Guinea coast, *Zosterops palpebrosa albiventris, Ducula bicolor, Ducula pacifica*, etc.).

Proximity to other areas is reflected in the avifauna. This is especially pronounced in the savannas of southern New Guinea, with its many species which are otherwise Australian (e.g., *Choriotis australis, Uroaetus audax, Seisura inquieta, Oriolus flavocinctus, Melithreptus lunatus*, etc.). Strangely enough while most of these occur only in south New Guinea, a few occur only in the Port Moresby area and a few are more widespread and have found their way to the north coast savannas (*Chlamydera cerviniventris*). The proximity of western New Guinea and the western Papuan Islands to the Moluccas is reflected in the occurrence of such Moluccan species as *Alisterus amboinensis* (east to Weyland Mountains) and *Eulipoa wallacei*, and such 'small island' Moluccan species as *Eos squamata* and *Tanygnathus megalorhynchus*. A similar but very weak relationship with the Bismarck Archipelago is seen in the occurrence of *Charmosyna rubrigularis* and *Macropygia mackinlayi* on Karkar Island.

Some species range throughout much of the New Guinea lowlands without breaking up into subspecies, such as the starling *Aplonis cantoroides* of the lowlands and the wood swallow *Artamus maximus* of the mid-mountains. However, many New Guinea forest as well as grassland birds break up into many subspecies on the island of New Guinea as well as on satellite islands. For example the grassland *Malurus alboscapulatus* has ten races and the lowland forest *Myiolestes megarhynchus* has twenty-two.

Spatial separation assisted by a network of minor ecological barriers such as rivers, marshes and swamps has provided the necessary isolation for the formation of many lowland species. In addition to this the isolation between the north and south lowlands provided by the barrier of the island's backbone of central mountains, plus (a) the partial isolation of the one thousand mile long 'central depression' lying between the main ranges and those of northern New Guinea, and (b) the partial isolation of the Vogelkop due to its isthmus, has given a main pattern of distribution. This pattern is (a) north New Guinea from Geelvink Bay to Astrolabe Bay or Huon Gulf; (b) south New Guinea from Triton Bay to Milne Bay; and (c) the Vogelkop and Onin Peninsula. This is often evident at the level of groups of subspecies and of representative species (e.g., the three geographically representative species of *Goura*) which together could well be considered a super-species.

However, these boundaries are not exact. Notable are some south-eastern New Guinea groups which extend around the eastern end of

New Guinea and westward to the Huon Gulf (e.g., *Paradisaea raggiana* interdigitating with *P. minor* group in north New Guinea), while the north New Guinea *P. minor* group also occupies the Vogelkop. Some north New Guinea species extend around the east end of New Guinea to occupy the southern lowlands west to Fly River (e.g., *Philemon meyeri*) or may cross the isthmus at the head of Geelvink Bay to occupy extreme western south New Guinea in the Mimika River area and extend a little way into the Vogelkop (e.g., *Monarcha rubiensis*).

Of especial interest are the areas of hybridization between forms which have nearly or quite reached the species level, of which the best examples are the Geelvink Bay – Triton Bay – Weyland Mountain area (e.g., *Chalcopsitta atra* and *C. scintillata*), and the 'hybrid gap' area of the eastern highlands (*Melidectes belfordi* and *M. rufocrissalis*; *Astrapia mayeri* and *A. stephaniae*. See also p. 461 on hybrid birds of paradise).

There are also species with very restricted ranges, such as *Philemon brassi* of the Idenburg River and *Pitohui incertus* of the Fly-Noord rivers; species known from very few specimens such as *Melanocharis arfakiana* of which one specimen came from Arfak and the second from south-eastern New Guinea, and there is one species, *Amblyornis flavifrons* known only by three specimens from an unknown locality.

Many of the forest mountain bird groups range throughout the mountain ranges at appropriate altitudes and many of these have developed local subspecies or have different representative species. The main pattern here is well shown by the representative species of the long-tailed bird of paradise, *Astrapia*: Arfak Mountains, *A. nigra*; Snow Mountains, *A. splendidissima*; Central Highlands, *A. mayeri*; south-eastern New Guinea, *A. stephaniae*; and the Huon Peninsula, *A. rothschildi*. The Snow Mountains have the richest fauna with a number of species without geographical representatives elsewhere, such as *Oreornis chrysogenys* and *Androphobus viridis*.

The grasslands show a certain zonation of species but the fauna is small and the endemics are few; of those birds restricted to the mid-mountain grasslands the most notable of which are the shrike (*Lanius*) and the chat (*Saxicola*), which are species that otherwise occur in the Malay Archipelago and Asia, and also endemic species of mannikins (*Lonchura*). On the Alpine grasslands the endemic species include the thrush (*Turdus*), the pipit (*Anthus*), the quail (*Anurophasis*), and certain species of mannikins (*Lonchura*).

### ALTITUDINAL ZONATION

The most striking pattern one finds in the distribution of forest birds is that correlated with altitude. As one leaves the lowlands and ascends the mountains, species after species found in lower altitudes disappears and other species appear, some to be left behind in their turn until near

the timber line the bird species are all different from those of the lowlands with the exception of certain nearly cosmopolitan species that feed exclusively on the wing (*Collocalia*, and possibly other swifts). The altitudinal zonation of species is gradual except at about 4,500 to 6,500 ft where a sharp avifaunal break occurs. At that 'line' virtually all birds found in the lower regions are left behind or have become rare, whereas above the 'line' the New Guinea naturalist will encounter, rather suddenly and confusingly, a new world of birds. This is the situation which the ever increasing numbers of New Guinea visitors encounter when, after becoming familiar with lowland and low mountain birds, they fly into the now readily accessible mid-mountain valleys (Wau, Goroka, Wahgi, Baiyer, Telefomin, Balim, etc.).

It must be kept in mind, however, that the altitudinal limits are not sharply bounded, as the following data for the bird of paradise *Astrapia splendidissima* on the north slope of the Snow Mountains indicate: uncommon from 5,700 ft to 7,000 ft, common from 7,000 to 9,000 ft, uncommon at 10,000 ft, and one seen at 10,700 ft. It is also found that the altitudinal limits in one area may not be those in another, as the data for the catbird *Ailuroedus crassirostris* show: found in the Snow Mountains from 2,700 to 3,800 ft; but in south New Guinea found only near sea level.

The number of species also decreases with altitude. The 1938–9 Archbold Expedition to the north slope of the Snow Mountains found about 150 species at the foot of the mountains, near sea level where forest, small marshes and lagoons were examined. A forest camp at 2,700 ft yielded ninety-five species, while a forest camp at 9,000 ft yielded sixty-five. At the continuous timber line, where forest, grassland, marshes and a lake were studied, the total list of birds was about fifty, and at 12,000 ft where the last outposts of shrubbery were found, there were seven birds characteristic of trees and shrubbery, six grassland birds and a swift – fourteen species in all. A single species, the flycatcher *Petroica archboldi*, was found only at 12,800 ft and above, where grass gave way to bare rock. This was a habitat it shared only with a thrush (*Turdus*) and a swift (*Collocalia*).

In general the largest and the smallest bird species live at the lower altitudes. When the average size (wing length) of all species of the avifauna of each altitude is taken, there is a decrease in size with increase in altitude. This is, of course, understandable when correlated with the smaller size of the vegetation, with smaller interstices between the branches, and with smaller size of insects and fruits; the units of bird's food at higher altitudes. This would seem to correlate well with the larger species of birds at lower altitudes. The fact that the smallest species of birds also live at lower altitudes seems a contradiction at first. It may, however, be possible that where there are very large birds in a

habitat they leave vacant niches in which small species can live without competing with their large relatives.

A more puzzling aspect of the relation of size to altitude is presented by the increase in size (wing-length) with increase in altitude within a species; a special case of 'Bergmann's Rule' as shown by the parrot, *Cacatua galerita*, and the swifts *Collocalia*.

Thus within the avifauna as a whole there is an average decrease in size with increase in altitude, but within certain individual species (*Cacatua, Collocalia*) there is an increase in size. There is no obvious explanation for the existence of these apparently contradictory patterns.

While it is hardly possible to give long lists of species for each altitudinal range, it is advisable to give some examples from a few families.

Of the birds of paradise found on the north slope of the Snow Mountains, seven species were found only in the lowlands and on the lower mountain slopes (including the rifle bird, twelve-wired, king and lesser birds of paradise); four were found only in the mid-mountains (including magnificent, six-wired and superb birds of paradise). In the high mountain forests there were three (long-tailed *Epimachus, Astrapia,* and *Pteridophera*) and one in the upper part of the high mountain forests and especially near the timber line (*Macgregoria*).

Of twenty-six species of parrots, fifteen were found only in the lowlands and the lower mountains, including all the large species (black cockatoo, white cockatoo, and vulture headed parrots); six lived mostly in the mid-mountain forests and five lived in the higher mountains.

The pigeons are still more of a lowland group. Of the twenty-six species, seventeen, including all the large species, lived only in the lowlands and the lower mountains; seven ranged in the mid-mountain forests and only two, both medium-sized species, lived in the high mountain forests.

### Climate

These data on climate are from a relatively few stations. Rainfall especially, can be very different in areas but a short distance apart. This must be remembered in reading the following.

In general, the climate is divisible into two seasons, a 'dry season' which occurs during the period May to November, and a 'wet season' which occurs from October to April. However, the 'dry season' is relatively wet, with rain falling frequently. These seasons are controlled by two major wind systems, which predominate during eight months of the year; namely, (a) the south-east trades which operate from June to October, and (b) the north-west monsoon which operates in the reverse direction from December to March. Both wind systems convey much

moisture to the island but the amount of precipitation in any one spot is regulated by the height and the position of the land in relation to the wind.

Rainfall varies locally from 55 in. to more than 300 in. a year. Temperature, like rainfall, is regulated by the height and position of the land and the strength and direction with which it is swept by rain-laden winds. Temperatures at sea level rise as high as 95° F. and rarely fall below 70° F. In mid-mountain valleys the range is from about 50° F. to 80° F. As a general rule, the temperature drops 3° F. for every 1,000 ft of altitude with night ice forming frequently at 11,000 ft (Mt Wilhelm) and a permanent snowline occurring at 15,345 ft (Mt Carstensz).

## Migrants

Little attention has been paid to the non-breeding birds that visit New Guinea. These fall into two categories: those from the north, fleeing the northern winter and visiting New Guinea in the austral summer, during the period December to February; and those from the south, visiting New Guinea in the austral winter, during the period June to August or September.

### PALEARCTIC MIGRANTS FROM THE NORTH

Most of these are shore birds (*Erolia, Pluvialis, Capella, Charadrius,* etc.) which nest in the far north of Asia. Many more species will surely be added to this list. Their relative abundance and times of arrival and departure need to be recorded.

Of the other groups; a cuckoo (*Cuculus*), two large swifts (*Apus* and *Chaetura*), a swallow (*Hirundo*), a grass warbler (*Locustella*) and a fly-catcher (*Muscicapa*) etc., only the swifts seem to be common and conspicuous during their stay in New Guinea.

### MIGRANTS FROM THE SOUTH

There is probably considerable migration between Australia and south New Guinea and less to other parts of New Guinea. The extent and volume of this migration is yet to be determined. Among the birds involved are *Egretta garzetta, Threskiornis moluccus,* a *Eurostopodus,* a *Merops, Scythrops, Eudynamis, Chalcites, Petrochelidon, Coracina novahollandiae,* a *Dicrurus* and certain *Myiagra.*

Bird banding activities in Australia, carried out under the auspices of the CSIRO (Commonwealth Scientific and Industrial Research Organization), have already yielded some interesting records: a little egret banded as a chick in Australia in January 1960, was taken in Papua in September of the same year; and an ibis banded as a chick in Australia in 1958 was taken in Papua in 1960.

Some migrants are conspicuous in south New Guinea in the austral

winter and day-time southward migration at the end of the winter has been seen along the Fly River.

A study of migration will not only indicate the time, occurrence and abundance of migrants, but will also aid in clarifying the taxonomy of certain forms. For instance, the Australian *Dicrurus* and *Eudynamis* occur in south New Guinea where there are closely related Papuan forms which are considered subspecies of one species. If, as is suspected, some of the Australian-type birds are not migrants but stay all year in New Guinea and breed, certain concepts of species limits will have to be adjusted.

MOVEMENTS WITHIN THE PAPUAN SUBREGION

The seasonal fluctuations of the height of water in the big marshes and rivers may well cause local shifts in populations of shore, marsh and water birds (ducks, ibis, stilts, herons, etc.), and possibly involve movements to and from Australia. The sudden periodic flowering of certain trees may cause movements of large numbers of lories (such as *Trichoglossus*), and it is possible that certain small island pigeons (*Ducula*) may wander in flocks to find trees in fruit.

The night flights to roost undertaken by certain parrots (such as *Pseudeos*) may be conspicuous and perhaps are seasonal and may cover many miles. At certain seasons in the lower Markham River area, the hornbill flies in large flocks to and from its night roosts. This is one of the most impressive bird sights in New Guinea.

In as sparsely settled an area as New Guinea, the discovery of stray birds and an interpretation of such occurrence is chancy. The Archbold Expeditions to the Snow Mountains found a starling (*Aplonis metallica*) floating dead in Lake Habbema (at about 10,000 ft). This starling is otherwise known as a lower altitude bird.

In some areas with native populations, quite a number of species (cassowaries, parrots, hornbills, myna birds) are carried about as pets and are sometimes traded for long distances. A live frigate bird seen by the junior author in the possession of Maimah, a native chief of the Kubor Mountains, was such a bird as are all of the cockatoos and hornbills found about villages in the Wahgi region (above 5,000 ft). Cassowaries make fine pets when young; later they become dangerous and are often allowed to become feral in the woodlands near the villages where they were reared. One has, therefore, to be particularly careful in making observations of such species.

## Breeding Seasons

Breeding seasons over the world in general are adaptations to local conditions, especially food supply. This may vary from place to place for one species and may vary from species to species making general

patterns difficult to see. Food supply is usually correlated with climate and weather, especially temperature and rainfall. In non-tropical lands where there are pronounced seasonal differences in daylight this correlation with climate which correlates with food supply and thus change in daylight itself may be the factor that initiates breeding. In arid regions with seasonal or sporadic rainfall the onset of rain itself may start breeding. In the humid tropics near the equator where conditions are fairly uniform throughout the year, some birds may breed at any time of year. The individual itself may have a resting period after each breeding effort, a rest brought on by the bird's physiology and hence innate. As there are individual variations in this not coerced by the environment, the individuals of a species do not coincide in time of breeding and some may be found breeding all the year.

In adjacent areas, such as Australia, well south of the equator, there is a tendency for breeding in the austral summer, December, January, and February. Where conditions are arid with sporadic rains, some species breed on the rains whatever time of year they come.

In the East Indies, the tropics from 3° N. to 7° S. in latitude, reports say that most birds have a pronounced breeding season in the period March to July, i.e., in the austral winter season and this is correlated with the end of the rainy season. A few species, all inhabitants of cultivated areas, breed all the year.

In New Guinea we have no year-round record of birds nesting and few records of nests of any sort. To arrive at any idea of patterns, it becomes necessary to use less satisfactory data: (a) the condition of the gonads of birds collected for specimens, and (b) grouping data from different nearby stations. Such data from gonads have one advantage over the nest-recording method. One has a sample of what the whole population is doing and can compare the proportion of breeding and non-breeding birds each month.

In south-east New Guinea, from eleven main collecting locations spread over twelve months, from 23 to 129 species were collected from each station with an attempt to get a small series of each species. The percentage of species in breeding condition in each month ranged from fifteen to forty-four per cent of the number of species collected, with a high in the August to November period, when thirty-nine to forty-four per cent of the species collected were breeding, and a low in the December to March period, when fifteen to twenty-one per cent of the species were breeding.

Considering the total number of individuals breeding and non-breeding, the monthly percentage of breeding individuals was twenty to fifty-seven per cent. The distribution is: June to November, twenty to twenty-eight per cent; December to May, thirty-two to fifty-seven per cent.

It appears that there is much breeding all year round with a peak in number of species at the time of the austral spring, just before and at the beginning of the rains. But evidently not all the individuals breed at one time and the species breeding outside the peak period have a higher percentage of their individuals breeding than do those breeding in the peak period. Further investigation is obviously necessary.

**Birds and Man**

For months at a time in New Guinea we studied birds in areas without even a native trail to follow. When we were in more settled areas, most of the natives with whom we came in contact spoke language of which we learned only a word or two and for which there were no interpreters. Only in the coastal areas and a few mid-mountain localities was Malay, Motuan, or pidgin English, the common lingua franca, understood. Sign language can carry you far but communication is limited and the information exchanged is only basic and difficult to check. Thus we know little about native attitudes and beliefs concerning birds. From observations we have seen that some peoples (perhaps most?) take little interest in birds beyond getting feathers for fancy head-dresses for dances.

Very few peoples are bird hunters, using many-tined bird arrows; but birds as food were always incidental, except perhaps the cassowary which rates along with the pig as having sufficient flesh to warrant hunting, and whose feathers are often worn as everyday decorations in neck or arm ornaments. From this one can conclude that many Papuans have little knowledge of or interest in birds. A pitfall into which a person may fall when dealing with a people whose language he does not understand is illustrated by an incident from the first Archbold Expedition to the Owen Stanley Mountains. As we were new to the country we were prepared to record native names of animals. One day, with the morning's catch lined up, we asked the local natives for names. One by one we held up individuals from the series of each species and wrote down the names. When checking, we found we could get a 'name' for each individual specimen of each species. In the face of the language barrier we were unable to fathom the matter and abandoned the project. It has been found by the junior author that there are natives in some places who know a great deal about nature, as in the Telefomin region, the middle Sepik region, and the Finisterre and Adelbert Mountain regions. Here he communicated with them in pidgin English. It was necessary, however, to become fluent in pidgin first and then to seek out the local naturalists. Each area has such men, usually older men, who served as walking 'reference books'. Their knowledge is sometimes remarkable, as he found by spot checking. The need for verification is essential.

It appears that the effect of natives on bird life is minimal. It seems that actual killing of birds is of no importance except in the very limited areas surrounding white settlements when boys are supplied with shot-guns. In such places the larger pigeons, practically the only 'game' birds, are sometimes virtually wiped out.

There is, however, another aspect of the relationship between man and bird life which merits comment. The mid-grasslands are almost all secondary, the result of clearing land to grow sweet potatoes which are the staple crop of those mid-mountain people. This garden clearing has in places, as in the Balim or Grand Valley, largely replaced one special type of mid-mountain forest, that of the oaks (*Quercus sens. lat.* and *Castanopsis*) which have almost disappeared before the spread of Stone Age agriculture. Following this clearing, there may be numerous patches of secondary forest, mostly *Casuarina*, which have sprung up and are quite different in composition from the original mid-mountain forests.

# Order 1 Casuariiformes

## Cassowaries and Emus

*Two families, one in New Guinea*

### Family Casuariidae *Cassowaries*

The flightless, ostrich-like cassowaries are found mainly in the forests of New Guinea, Queensland in Australia, and the New Britain and Ceram islands.

A glossy black plumage, a naked blue and red neck and head, with a wattle in some species and a horny casque in the crown characterize the adults of both sexes. The newly hatched tan, black-streaked young pass through a brown immature plumage with feathered head, and gradually, over several years, acquire the black adult plumage. The colour of the neck also varies with age, sometimes having considerable yellow in it. Many species have been named, some naming being based on young birds, but there seem to be only three species, each with several subspecies. The species differ most obviously in size, shape of casque, and wattle. The largest cassowary stands about six feet high and weighs about a hundred pounds. The female is larger than the male.

The wing quills are bare black shafts; there are no tail feathers distinguishable from rump feathers, and the body plumage is composed of silky, disintegrated feathers, which have an aftershaft as long as the main feather (i.e., the feather appears double). The inner of the three toes bears a long, stout, straight and sharp claw, quite different from the others, and spearheads the dangerous forward kick of the fighting bird.

Cassowaries are monogamous. The nest is on the ground in the forest, with perhaps a few leaves added to the depression; three to eight eggs, up to about $3\frac{1}{2} \times 5\frac{1}{2}$ in. in size may be laid. The eggs are distinctive in appearance with dark green granules thickly scattered over them. In the case of captive birds, whence we have most of our data on breeding, the male does the incubating, for forty-nine to fifty-two days. The young are active from hatching and soon follow the parent(s). The male, at least, defends them fiercely.

The fruit that falls in the forest and litters the ground under the trees

throughout the year is the cassowaries' main food, and is swallowed whole, surprisingly large fruit being accommodated in the bird's wide gape. In captivity cassowaries are reported to eat many things, vegetable, animal, and mineral, and one was said to have plucked off a lady's hat and tried to eat it.

Cassowaries are sometimes common, but they are remarkably shy and retiring birds; seldom being seen despite their size even where their tracks in the mud and their copious droppings, filled with large fruit-pits, indicate the presence of large numbers. Sharing with the wild pig (which is not indigenous) the dubious distinction of being one of the two kinds of 'big game' in the New Guinea forests, they are much prized by the natives who hunt them with bow and arrow, collect the eggs for food, and catch and raise young birds. Cassowary flesh is prized and we found it dark, rich, and tasty, quite unlike that of most birds. This flesh is from the leg, of course, as the breast of these flightless ratite birds is practically without meat.

The young are commonly kept as pets. When grown up the birds are dangerous and are often securely penned in cages of close-driven stakes. Such birds are regularly plucked for their feathers and become, as it were, 'feather gardens' of considerable value, especially among such feather-loving people as those of the Wahgi Valley.

The feathers are used in native head-dresses. In certain areas such as at Telefomin the wing quills are habitually worn in especially drilled nasal perforations. Sometimes the quills are bent into hoops and used as earrings. Part of a leg bone may be used as a 'spatula' in the lime pot that goes with betel nut chewing and arrows are tipped with the pointed claws. One of the New Guinea names for these birds, Moruk, has some vogue in English-speaking countries, but the more common name comes from the Malay name Suwari. One or other species is commonly seen in European and American zoos.

The classification of cassowaries down to species and subspecies is still a matter needing the attention of specialists with more data. The colour of the bare skin of the head and neck has been used extensively, and this varies not only with species and geographically, but also with age and individually. Much more data on the character of populations are needed.

### Key to *Casuarius* Species (Adults)

1 Size small ($3\frac{1}{2}$ ft high); casque low; no wattles: *C. bennetti*.
Size large (4–6 ft high); neck wattles present: 2.

2 Casque high, triangular, flattened posteriorly; a single, club-shaped central neck wattle: *C. unappendiculatus*.
Casque compressed and blade-like; neck wattles two or single and forked: *C. casuarius*.

***Casuarius casuarius* (Linnaeus)**

**Double-wattled Cassowary.** Height up to 6 ft. Adults: plumage black, casque high, blade-like, and often turned to the left; wattle varies geographically from a long pendant wattle forked at the tip on front of neck (south New Guinea), to a pair of wattles, one on each side of neck (western Vogelkop); colour of bare neck mostly blue and red or pink, sometimes with some yellow; young birds have a brown plumage, with much pink and yellow in the neck skin; younger birds have the head feathered; newly hatched chicks are brown, streaked black.

RANGE Ceram (introduced?), New Guinea lowlands, Aru Islands, and north Australia.

SUBSPECIES IN NEW GUINEA Six, based on wattle shape and colour of neck:

a) *bicarunculatus* (Sclater); western Vogelkop; a wattle on each side of neck.
b) *tricarunculatus* (Beccari); west coast Geelvink Bay; a pair of wattles on front of neck.
c) *sclaterii* (Salvadori); south New Guinea, Milne Bay to Mimika River; a single median wattle, forked at tip.
d) *bistriatus* (van Oort); north New Guinea, Geelvink Bay to Tana Mera; a single median wattle forked for half its length.
e) *aruensis* (Schlegel); Aru Islands; wattles as in *sclaterii*(?) or a pair on fore neck(?).
f) *lateralis* (Rothschild); locality unknown; a pair of wattles; other characters(?).

REMARKS The black of the feathers and the bright blue and red of the neck have been called the opposite of concealing. But on a cassowary in the dark shade of the forest, these colours seem as inconspicuous as any. Occasionally we saw a bird walking on the forest edge, but usually it saw us as quickly and disappeared. More often we saw droppings or tracks, or heard their deep-voiced 'chug-chug' from the forest. Living in swampy forest as many of these birds do, the waterways are no barrier to them. One we saw swimming across the half-mile wide channel of the middle Fly River towards our camp. Only the head and upper neck were out of the water, for the body is not as light as that of a flying bird. The cassowary, in spite of this, was making good progress and was almost across when the cookboy saw it.

The natives brought us not only cassowary eggs roasted and ready for eating, but also living young. One of these small, striped babies became very tame. It walked about among the camp personnel, ignoring them most of the time. But if a boy, sent on an errand, ran quickly the young cassowary followed full tilt. Presumably this is an expression

of its habit of following its parent when the latter flees an enemy. However, enemies of even a young cassowary cannot be common in these forests, and those of an adult, except for crocodiles and men, must be non-existent, for this bird is the largest endemic land animal in New Guinea.

### *Casuarius unappendiculatus* (Blyth)

Single-wattled Cassowary. Height about 5 ft. Adults: plumage black; casque high and triangular, flattened on the back; a single club-shaped wattle on the fore neck; small wattles near the corners of the gape; colour of bare skin of head and neck mostly blue, with some red and yellow; young presumably with plumages as *C. casuarius*.

RANGE North-west New Guinea lowlands, west of Astrolabe Bay and on some western islands.

SUBSPECIES Four recognized, based on variation in colour of soft parts, especially in amount of yellow:

a) *unappendiculatus* (Blyth); Salawati and western Vogelkop.
b) *occipitalis* (Salvadori); Japan Island and nearby coast(?).
c) *aurantiacus* (Rothschild); Mamberamo to Sepik Rivers.
d) *philipi* (Rothschild); Sepik River to Astrolabe Bay (not separable from the preceding?).

REMARKS When we were in the haunts of this bird, in the swampy lowland forest of the upper Mamberamo River, we found it scarce, in marked contrast to the abundance of the double-wattled cassowary in similar terrain on the middle Fly River. This was impossible to correlate with hunting pressure for the Mamberamo swamps were largely uninhabited. This bird was also scarce in the middle Sepik River region, but fairly common in the swamp forests on the Ramu River side of the Adelbert Mountains.

### *Casuarius bennetti* (Gould)

Dwarf Cassowary. Height 3½ ft. Adults: plumage black; casque low and triangular, flattened posteriorly; no wattle (though a 'button' sometimes present on fore neck); head and neck bare and coloured blue and pinkish red; side of lower neck orange-red. Immature presumably with stages similar to *C. casuarius*.

RANGE Mountains of New Guinea, also lowlands and on the New Britain and Japen Islands; up to 10,000 ft.

SUBSPECIES Six recognized, based chiefly on colour of patterns of naked skin on head and neck:

a) *papuanus* (Schlegel); Vogelkop.

b) *goodfellowi* (Rothschild); Japen Island.
c) *claudii* (Ogilvie-Grant); south slopes of Nassau Mountains.
d) *picticollis* (Sclater); south-eastern New Guinea.
e) *hecki* (Rothschild); northern New Guinea from Huon Peninsula to Sepik River.
f) *shawmayeri* (Rothschild); Kratke Mountains.

REMARKS This small cassowary lives not only in the lowlands in part of its range, but also far up in the mountain forest where we have seen its signs as high as 10,000 ft. We found it very scarce in the mountains as one might expect from the scarcity of large fruit there. Possibly its small size, compared with the lowland species, is correlated with the smaller size of most fruit, its favourite food, in the mountains.



# Order 2 Podicipediformes

## Grebes

*One family*

### Family Podicipedidae *Grebes*

(*Twenty species, two in New Guinea*)
Grebes are water birds somewhat resembling ducks in superficial appearance. When resting they swim and float about on the surface of the water. When alarmed they dive and swim away under water. They also seek their food, which consists of a wide variety of aquatic invertebrate animals, fish and frogs, under water. It is unusual for grebes to fly but when they do they take off with a pattering run and fly with rapidly beating wings in direct flight (there are flightless American species). These birds normally do not come on land where they would be virtually helpless.

The grebe family is of nearly world-wide distribution and contains about twenty species of which more than half live in the Americas. Grebes vary from eight to twenty-four inches in length; have a sharp-pointed bill (most species); short narrow wings; feet placed far to the rear of the body; a flattened tarsus and toes not completely webbed but each broadly lobed; rudimentary tail; and silky plumage. In colour grebes are grey to black above; pure white or more or less grey or blackish tinged below; the head and neck in the breeding season sometimes have areas of red, brown or yellow and ornamental ruffs or crests.

At nesting time the birds pair; some have elaborate courtship ceremonies and loud calls. A nest is made by bringing together sodden aquatic vegetation into a mound in shallow water or into a floating raft-like structure. On top of this a shallow hollow is made for the three to eight eggs. These are unspotted and are at first whitish, but darken with age. Both sexes share incubation but when the eggs are left unattended they are covered with nest material. The young hatch covered with down. This has a streaked and spotted pattern (except in an American species). The young are able to follow their parents shortly after hatching and are sometimes carried among the feathers on a parent's back.

The usual grebe habitat is quiet stretches of fresh water with much herbaceous vegetation, but in non-breeding periods some live on salt water. Grebes may be solitary or colonial nesters, and some gather in flocks in the non-breeding season. Species outside the warmer parts of the world are migratory.

A curious habit of eating feathers is common among grebes and seems to have no adequate explanation.

Three species of grebes occur in Australia, and two in New Guinea.

### Key to *Podiceps* Species (Adults)

Throat black: *P. novaehollandiae.*
Throat rufous: *P. ruficollis.*

### *Podiceps novaehollandiae* (Stephens)

**Little Grebe.** Length 10 in. Adult male, in breeding plumage: top and sides of head and neck black with a chestnut area from behind eye to side of neck; rest of upperparts greyish black; throat black; fore neck grey; upper breast and flanks greyish white dappled with dusky; lower breast and abdomen silvery greyish white or pure white; wing above blackish with secondaries extensively white and wing below extensively white; iris yellow with conspicuous naked skin from eye to base of bill pale whitish to yellow, rest of bill black with yellow tip; feet blue-grey to black; wing 95–114 mm, exposed culmen 17·5–22 mm. Female similar but slightly smaller. Immatures: duller and greyer above; throat white; lack the rufous in side of neck; a white line behind eye. Whether adults have a non-breeding plumage resembling that of the immatures remains to be determined.

RANGE Australia and Tasmania and in isolated colonies from Java to New Guinea, and the New Hebrides.

SUBSPECIES IN NEW GUINEA Two:

a) *novaehollandiae* (Stephens); Australia to south New Guinea and lakes in Snow Mountains; wing 103–14 mm, exposed culmen 17·5–22 mm.
b) *incola* (Mayr); north New Guinea; differing in shorter wing 95–104 mm, exposed culmen 19–22 mm.

REMARKS It used to be thought that birds of this species found on the tropical islands were migrants from Australia, and this may be true of some individuals. However, breeding birds have been found on alpine lakes and in lowland waters. In the great lagoons and marshes of the middle Fly River where conditions would seem ideal, only a single pair was found by the Archbold Expeditions. The species has been found to be fairly common in January and May on the lower and middle Sepik.

Like the little grebe in Europe, some Sepik River specimens had lost all their wing quills and were flightless, evidently in post-breeding plumage. None, however, had moulted into a dull non-breeding plumage which possibly does not occur in New Guinea.

***Podiceps ruficollis* (Pallas)**

**Red-throated Little Grebe.** Length 10 in. Very like the Australian little grebe but most easily distinguished by the throat as well as sides of neck being rufous chestnut in the breeding plumage; also less white in the secondaries, and underparts greyer, washed with pale chestnut; iris blood-red with naked skin at base of mandible pale yellow. Wing 104 mm, exposed culmen 26 mm, tarsus 40 mm.

RANGE Africa, Europe and parts of Asia and the Malay Archipelago east to New Guinea and the Solomon Islands.

SUBSPECIES IN NEW GUINEA One, *tricolor* (Gray), from Celebes, the Moluccas and north New Guinea to the Solomon Islands; wing 104 mm, exposed culmen 26 mm, tarsus 40 mm.

REMARKS This widespread, northern species characteristic of ponds and lakes lives in some of the lowland waters in north New Guinea, but some of the records between this species and the preceding have been confused. Apparently both species occur, and probably breed on Sentani Lake in north New Guinea.

# Order 3 Procellariiformes

## Albatrosses, Shearwaters, Petrels and allies

*Four families, two in New Guinea*

The birds of this order vary greatly in size, from tiny storm petrels six inches long, to albatrosses four feet long. They are all long-winged, web-footed sea birds with bills hooked at the tip and nostrils opening in a tube, or a pair of tubes, on top of the bill. Except when nesting, these birds spend their lives at sea, flying low over the water, feeding from its surface, and sleeping on it. This group is well represented in southern oceans, but some individuals occur in tropical and northern waters. The few individuals of four species reported from the New Guinea area seem to be strays, but another dozen or so that are known from adjacent seas may yet be found here. See W. B. Alexander, *Birds of the Ocean*, Putnam, New York, 1954.

### Family Procellariidae *Petrels* and *Shearwaters*

Three species have been recorded:

PACHYPTILA TURTUS (Kuhl) Fairy Prion. A species of southern oceans; one New Guinea record from mouth of Fly River.

PUFFINUS LEUCOMELAS (Temminck) White-faced Shearwater. A northwest Pacific Ocean species; several records for north coast of New Guinea.

PUFFINUS PACIFICUS CHLORORHYNCHUS (Lesson) Wedge-tailed Shearwater. A species of the warmer parts of the Pacific and Indian Oceans; one New Guinea record.

### Family Hydrobatidae *Storm Petrels*

A single sight record of *Fregetta grallaria* has been carried on in the New Guinea bird literature.

# Order 4 Pelecaniformes

## Pelicans and allies

*Six families in New Guinea*

### Synopsis of Families

1 PHAETHONTIDAE Tropicbirds; sea birds about 15–19 in. long, not including the narrow, elongated central tail feathers which may give a length of 30 in. to the adult; plumage mostly white and general appearance somewhat tern-like; bill pointed, chin feathered; feed by plunging from the air; figure 4.

2 PELECANIDAE Pelicans; water birds, 50–72 in. long; bill very long (over 12 in.), broad, hooked at tip, and with large, naked gular pouch; plumage white with some black; figure 3.

3 SULIDAE Boobies; sea birds, 26–40 in. long; bill stout and bluntly pointed; feed by plunging from the air; figure 4.

4 PHALACROCORACIDAE Cormorants; water birds of fresh water and coast, 23–32 in. long, that feed by swimming and diving; bill sharply hooked; blackish or black and white birds; figure 3.

5 ANHINGIDAE Anhingas or Darters; birds of fresh water, 35 in. long, that feed by swimming and diving; bill slender and sharp-pointed; figure 3.

6 FREGATIDAE Frigate birds; sea birds, 31–41 in. long, with long bill hooked at tip; wings very long and narrow; tail long, deeply forked; feed by snatching fish from the surface without alighting, or by robbing terns and boobies; figure 4.

### Family Phaethontidae *Tropicbirds*

*(Three species, one in New Guinea)*

A family with but three species; tropicbirds live in the warmer waters of the globe. These birds are sometimes found far from any land. They fly with a flapping, somewhat pigeon-like flight some distance above the water, and they dive head first upon their food of fish or squid. A

tropicbird will sometimes circle a ship, apparently from curiosity, and sometimes give a harsh shrill cry.

These birds nest in colonies on remote islands; on cliffs or on the ground, laying a single spotted egg without any nest being built. The downy young stay on or near the nest site until well grown and nest duties are shared by both parents.

Only one species has been recorded for the New Guinea area.

***Phaethon lepturus* (Daudin)**

White-tailed Tropicbird. Length 30 in., including the two elongated central tail feathers which project about 15 in. beyond the rest of the tail. Adults: generally white with a black line in front of, over and behind eye; black band on the wing involving median wing-coverts, scapulars and inner secondaries; much black in primaries; small black patch in flank; iris brown; bill yellow or reddish; legs yellowish; toes black. Wing 275 mm, tail 470 mm, culmen 55 mm, tarsus 22 mm. Immatures: similar but with crescent-shaped black marks on upperparts and flanks, and lacking the elongated central tail feathers (i.e., total length about 15 in.).

RANGE Tropical seas; one record New Guinea (Woodlark Island).

REMARKS Two other species, the red-tailed tropicbird, *P. rubricauda* (Boddaert), with elongated central tail feathers red, and the red-billed tropicbird, *P. aethereus* (Linnaeus), with red bill, elongated central tail feathers white, and back with crescent-shaped black marks, may occur.

## Family Pelecanidae *Pelicans*

*(Six species, one in New Guinea)*

Pelicans form a small family of six species, some of which occur on every continent. They are birds found in rivers and lakes and on sea coasts. Some dive for fish from the air, but most species feed while swimming on the surface, scooping up fish in the capacious pouch.

Nests are in colonies, on ground or in trees. The young hatch naked and later grow a coat of down. Both sexes share nest duties, and the young may leave the nest and walk about when well grown but still unable to fly. One species occurs in New Guinea.

***Pelecanus conspicillatus* (Temminck)**

Australian Pelican. Length 60–64 in. Adults: plumage white with black wing and tail feathers, and some upper wing-coverts and upper tail-coverts also black; crest on back of head, greyish brown; iris brown; bill and pouch pale flesh-colour; feet pale yellow-brown. Wing 625

mm, tail 182 mm, culmen 440 mm, tarsus 125 mm. Young similar but dark parts of plumage brown, not black.

RANGE Australia and south New Guinea (Port Moresby to Merauke area); possibly only a migrant to New Guinea.

NESTING [In colonies, on islands; nests scant hollows in ground, with or without lining; eggs two or three, white with a limey coating; size 95 × 55 mm. Australian data.]

REMARKS Our records are for single birds, flying along the coast or resting on sandpits.

## Family Sulidae *Gannets* and *Boobies*

*(Nine species, three in New Guinea)*

This is a family of nine species from tropical and temperate zone seas near coasts and islands. The birds are usually in flocks, often well off shore, and they feed by flying over the water and diving from the air for fish. Nesting is in colonies on islands in the sea, or on cliffs. Nests are on the ground, on cliffs or in trees. The eggs, one to three in number, are bluish with a chalky or limey coating. The young hatch naked and helpless, and later grow a coat of down. Both sexes share nest duties.

Three species of boobies have been recorded in New Guinea waters.

### Key to *Sula* Species

1 Tail feathers white, body plumage white or brown, feet red: *S. sula* (adult).
Tail feathers black or brown, feet not red: 2.

2 Back white or with white areas: *S. dactylatra.*
Back brown, without white: 3.

3 White abdomen contrasting with brown breast: *S. leucogaster* (adult).
Abdomen pale brown: *S. leucogaster* and *S. sula* (immatures).

### *Sula dactylatra* (Lesson)

Blue-faced Booby. Length 34 in. Adults: white with brownish black wing and tail feathers, and greater wing coverts; iris yellow; bill horn-coloured with orange at base in male and light red in female; naked skin of face and throat blue-black; feet olive or grey. Wing 425 mm, tail 187 mm, bill 102 mm, tarsus 55 mm. Immatures: upper parts greyish brown, with some white in back.

RANGE Tropical seas.

SUBSPECIES IN NEW GUINEA One, *personata* (Gould), recorded in Torres Straits and at East Cape; nests on islands in northern Australian waters.

NESTING [Colonial; a shallow hollow scraped in the ground on an islet; eggs two, bluish; size 66 × 44 mm. Australian data.]

### *Sula sula* (Linnaeus)

Red-footed Booby. Length 29 in. Adults: white with black primaries (some individuals with greyish brown plumage seem to represent a colour phase); iris yellow or grey-white; bill grey with tip brown and base red; naked skin of face blue and of throat grey or black; feet red. Wing 365 mm, tail 212 mm, bill 82 mm, tarsus 37 mm. Immatures: generally dull brown, paler below.

RANGE Tropical seas.

SUBSPECIES IN NEW GUINEA One, *rubripes* (Gould), of the Indian Ocean and the tropical Pacific; has been recorded on both the north and south New Guinea coast.

NESTING [A stick nest placed in a bush or tree on an island; a single egg, bluish white; size 57 × 39 mm. Australian data.]

### *Sula leucogaster* (Boddaert)

Brown Booby. Length 29 in. Adults: plumage generally blackish brown except for white abdomen, under tail-coverts, axillaries and some under wing-coverts; iris grey; beak yellowish; naked skin on face yellow with grey lores; legs pale yellow. Wing 392 mm, tail 200 mm, bill 84 mm, tarsus 43 mm. Young birds are dusky brown with underparts paler.

RANGE Tropical seas.

SUBSPECIES IN NEW GUINEA One, *plotus* (Forster), of the tropical western Pacific.

NESTING [In a hollow scratched in the ground, with or without seaweed added; eggs two, greenish white with a dense chalky covering; size 57 × 42 mm. Australian data.]

REMARKS This is the most common booby in the New Guinea area, and breeds on the islands in Torres Straits. We found it common in the waters south of Daru Island in April. In western Australia, this species was the producer of the guano deposits on such islands as the Lacepedes.

## Family Phalacrocoracidae *Cormorants*

*(Thirty species, three in New Guinea)*

There are some thirty species of cormorants, and some are found on coasts or waterways in most parts of the world. Cormorants fly with a

heavy, duck-like flight. They spend a good deal of time swimming and diving for their food of fishes or other aquatic animals, and also can frequently be found perched on rocks or branches of trees, often with wings spread to dry the feathers. The birds are gregarious, and where they are common, fly and feed in flocks, and nest in colonies in trees, in cliffs, or on the ground. The young are hatched naked and helpless, but later grow a coat of down. They stay in the nest until able to fly. The sexes share nest duties. The voices of cormorants consist mostly of grunting noises and in most species are heard only about the nests.

Three species have been recorded in New Guinea, but only two are of regular occurrence, and these are birds found by lakes, lagoons and quiet stretches of rivers.

### Key to *Phalacrocorax* Species

1 Conspicuously black above, white below: *P. melanoleucos.*
Underparts black or brownish, or at most abdomen whitish: 2.
2 Size small, length about 24 in.: *P. sulcirostris.*
Size large, length about 32 in.: *P. carbo.*

### *Phalacrocorax sulcirostris* (Brandt)

Little Black Cormorant. Length 24 in. Adults: plumage glossy black except for upper back and wings which are grey, each feather with a black margin, and in breeding plumage the head and neck are sprinkled with white; iris green; bill blue-grey with dark culmen; skin about eye and chin dark blue-grey; feet black. Wing 242 mm, tail 125 mm, culmen 42 mm, tarsus 45 mm. Immature like adult but brownish.

RANGE Borneo and Java to New Guinea area and Australia. In New Guinea, in the lowlands and in Aru Islands and Fergusson Island.

NESTING [In colonies sometimes associated with other species; nest a platform of sticks in a tree in a swamp; eggs four, greenish white with a heavy chalky surface layer; size 47 × 31 mm. Australian data.]

REMARKS In Australia this is a river species, but in nearly a year spent on the Fly River of south New Guinea, we did not find it. However, the species was fairly common on the lowland lagoons of the Idenburg River of north New Guinea where, during a morning's canoe travel thirty to forty of these birds were seen, and it is abundant in the middle Sepik region particularly in the vicinity of Aibom where sometimes fifty or more birds could be seen perched in trees bordering the lakes and at Kanganaman where frequently skeins and chevrons of fifty or more were seen in flight. In this area natives are reported to lure live birds with bonfires on foggy evenings, the light causing some of the

birds to plummet into the flames. These birds are used for food. Four stomachs examined contained only fish.

***Phalacrocorax carbo* (Linnaeus)**

Big Black Cormorant. Length 32 in. Adults, in breeding plumage: area about base of lower mandible white or whitish; head and upper neck black sprinkled with white; rest of neck, underparts, wings and tail glossy black but with a white patch on flanks; upper back, scapulars and wing-coverts olive-brown, each feather edged with black. Adults in non-breeding plumage similar but without white on head and neck. Iris green; bill yellow; culmen dark grey. Wing 357 mm, tail 155 mm, culmen 67 mm, tarsus 60 mm.

RANGE In parts of North America, Africa, Europe, Asia, Australia and New Zealand.

SUBSPECIES IN NEW GUINEA One, *novaehollandiae* (Stephens), the Australian subspecies, recorded once in south New Guinea (Alkmaar, Noord River).

NESTING [In colonies in trees in swamps; nests of sticks; eggs three or four, greenish white with chalky surface; size 60 × 36 mm. Australian data.]

REMARKS This species may be only a straggler to south New Guinea, from Australia.

***Phalacrocorax melanoleucos* (Vieillot)**

Little Pied Cormorant. Length 23 in. Adults: upperparts glossy black, the mantle greyer, and each feather outlined in black; underparts, including sides of head and neck white, but flanks black; iris brown; bill dusky yellow with culmen dark brown; bare skin about eye and chin yellow; legs black. Wing 225 mm, tail 152 mm, culmen 34 mm, tarsus 38 mm.

RANGE Sumatra, through the Malay Islands to Solomon Islands, Australia and New Zealand. In New Guinea, in lowlands and occasionally common at 5,000 ft, and one record at 10,300 ft. Also recorded in Aru Islands, Misol, Salawati, Waigeu and Numfor.

SUBSPECIES IN NEW GUINEA One, *melanoleucos* (Vieillot).

NESTING [In colonies, sometimes associated with the little black cormorant; nest a platform of sticks in a tree in a swamp; eggs three to five, pale blue with a chalky surface; size 46 × 31 mm. Australian data.]

REMARKS This is the commonest and most widely distributed cormorant in New Guinea, on river and lagoon, but even so it is not

abundant. However, on the Sepik River it is outnumbered by the little black cormorant.

In north New Guinea, in the Idenburg River lagoons, this species was much outnumbered by the black cormorant, and only two or three were seen in a morning's travel by canoe. However, on the Fly River lagoons where the black cormorant did not occur, this species was fairly common, feeding in the bays and as many as eight or ten birds were sometimes resting in one dead tree. On the Balim River, at 5,000 ft where this was the only cormorant, it was fairly common, up to twenty or thirty birds being seen roosting in a dead tree over the river. At Lake Habbema, a single bird was found living at about 10,300 ft.

Several specimens were found to have eaten crayfish and frogs, while only fish were found in the stomachs of several black cormorants.

## Family Anhingidae *Anhingas* (or *Darters*)

*(One species in New Guinea)*

Anhingas form a family of only a few species, living in the warmer parts of the world. They are fresh-water birds, found on rivers and lakes. When swimming, they float very low in the water, and when alarmed may submerge until only the small head and snake-like neck are exposed. Their food, usually fish, is secured by pursuing it by swimming underwater. When resting, the anhinga flies to some perch above the water, where it may hold its wings widespread to dry for some time. Less gregarious than cormorants, anhingas are usually solitary when fishing, and often when perching.

The young hatch naked and helpless, and later grow a coat of down. Both parents care for the young in the nest until they can fly.

### *Anhinga rufa* (Daudin)

Australian Anhinga or Darter. Length 35 in. Adult male: crown, hind neck and fore back blackish brown, paler and more rufous brown on fore neck; a white area on chin, and a white line from below eye down side of fore neck; rest of upperparts black with conspicuous buffy streaks in centres or margins of scapulars, inner secondaries, and wing-coverts; underparts from basal third of neck to tail, black. Female similar but underparts from chin to under tail-coverts buffy white and stripes on mantle less conspicuous. Iris yellow; bill greyish and greenish olive; feet brownish or pale grey. Wing 350 mm, tail 230 mm, culmen 80 mm, tarsus 50 mm.

RANGE Africa, southern Asia to Australia. In New Guinea on lowland rivers and lakes; also Fergusson Island.

SUBSPECIES IN NEW GUINEA One, *papua* (Rand).

NESTING [In colonies; nest of sticks in a tree, in swamp; eggs three or four, greenish with a whitish chalky surface layer; size 56 × 34 mm. Australian data.]

REMARKS The anhinga is a rather uncommon, shy bird of rivers and lagoons. We found it most common on the lagoons of the middle Fly River, where the birds fed singly in the bays, and then flew to rest on isolated trees where two or three of them might gather.

## Family Fregatidae *Frigate-birds*

*(Ten species, two in New Guinea)*
A small family of ten species living on and near oceanic islands in the tropical parts of the world. Two species occur in New Guinea waters. With long, narrow wings, long, deeply forked tail, and a relatively light body, these birds spend much time soaring and sailing. They seem never to alight on the water but snatch their food of small fish or other marine animals from the surface water with their long, hooked bills, or harry other fish-eating birds such as tropicbirds, terns or boobies until they drop their prey when the frigate-bird will swoop down and seize it in the air or from the surface of the water. Frigate-birds sleep perched on branches of trees, and they rarely range far from coastal waters. They are often gregarious, and nest in colonies, building their stick nests in trees. In courtship, the males inflate their red gular pouches. The young hatch naked and grow a coat of white down. They stay in or near the nest until they can fly. Both sexes share nest duties.

### Key to *Fregata* Species

1 Breast black: 2.
Breast white: 3.
2 Whole underparts black: *F. minor* (male).
Underparts black except for white flank patches: *F. ariel* (male).
3 Crown black, throat whitish: *F. minor* (female).
Crown black, throat black: *F. ariel* (female).
Whole head, neck, and underparts white: 4.
4 Larger, length 34–41 in.: *F. minor* (immature).
Smaller, length 31 in.: *F. ariel* (immature).

### *Fregata minor* (Gmelin)

Greater Frigate-bird. Length 34–41 in. Adult male: plumage generally black glossed green or blue on upperparts and tinged brownish below and with a brown band across upper wing on median wing-coverts and

inner secondaries; a large distensible red gular pouch present. Female: upperparts black with a brown collar on hind neck and the light brown band on wings; underparts, throat greyish white, breast white, flanks and abdomen black. Immatures: head and neck all around and underparts white, often tinged rusty; rest of upperparts brownish black. Iris brown, bill grey or bluish, legs black to reddish. Wing 525–625 mm, tail 360–425 mm (deeply forked), culmen 100–50 mm, tarsus 20 mm.

RANGE Tropical parts of Indian, Pacific and south Atlantic oceans.

SUBSPECIES IN NEW GUINEA To be determined. There are only a few scattered records.

NESTING [Much as in the next species, egg size 67 × 46 mm. Australian data.]

REMARKS For general habits, see under family heading.

***Fregata ariel* (Gray)**

Lesser Frigate-bird. Length 31 in. Adult male: black, somewhat browner below, with a white patch on each side of abdomen. Female: mainly black, but with a chestnut collar on hind neck, a brownish patch on wing-coverts; breast buffy white and a white patch on each side of abdomen. Immatures: blackish brown except for all round the head and neck, and the breast and abdomen which are white marked with rusty. Iris brown; bill grey or bluish; legs black to reddish. Wing 550 mm, tail 300 mm (deeply forked), culmen 90 mm, tarsus 22 mm.

RANGE South Atlantic, Indian and Pacific Oceans in warmer waters.

SUBSPECIES IN NEW GUINEA One, *ariel* (Gray); a few scattered records, but apparently more common than these indicate.

NESTING [In colonies, nest of sticks placed in the top of shrub or low tree on island; single white egg; size 64 × 44 mm. Australian data.]

REMARKS The habits of the species are much like those of other members of the family.

# Order 5 Ciconiiformes

## Herons, Storks, Ibises etc.

*Six families, three in New Guinea*

### Synopsis of Families

1 ARDEIDAE Herons, bitterns, etc. Middle toenail with comb-like margin; bill straight, point and spear-like with a groove extending forward from nostril; in flight neck usually curved; figure 5.

2 CICONIIDAE Storks. Nail of middle toe without comb-like margin; bill stout, long, nearly straight and bluntly tipped, not grooved; in flight neck outstretched; figure 6.

3 THRESKIORNITHIDAE Ibises and Spoonbills. Nail of middle toe without comb-like margin; bill slender, grooved, and decurved (ibis) or expanded, spoon-like at tip (spoonbills); in flight neck outstretched; figure 7.

### Family Ardeidae *Herons* and *Bitterns*

*(Sixty species, fourteen in New Guinea)*

This family of some sixty species has a range that is nearly world wide. Herons are long-legged, long-necked, wading birds with a pointed, spear-like bill. Shallow waters, beaches, muddy shores and marshes, are the usual feeding places for herons, but some often feed on dry land. Fish is a favourite food, but a wide variety of animals, vertebrate and invertebrate is also eaten. Some herons feed in the open but are shy, flying to perch in a tree or at a distance when disturbed; others, especially bitterns, like the cover of dense reeds and are rarely seen in the open. Night herons feed by night and sleep in trees by day. Nests are often rude platforms of sticks in trees near or in the water, sometimes on the ground on islands, usually in colonies, but occasionally singly. Bitterns, however, may make a nest of grasses on the ground or among reeds in standing water in marshland. The eggs are plain, usually pale green-blue or buff. The young hatch covered with down and stay in the

nest for a considerable time before they are able to fly. Both sexes share nest duties. Heron voices are usually harsh squawks.

In New Guinea there are fourteen species, varying from the giant heron, forty-five inches long, to the least bittern, twelve inches long.

### Key to *Ardeidae* Species

1 Size very large, length 45 in.: *Ardea sumatrana.*
Size medium, length 15–35 in.: 2.
Size small, length 12 in.: 9.

2 Plumage wholly or mostly white: 3.
Back and wings cinnamon-rufous: *Nycticorax caledonicus* (adult).
Back and wings black, slaty, greyish or bluish: 7.
Back brown, spotted with white: *Nycticorax caledonicus* (immature).
Back barred black and buffy: *Zonerodius heliosylus.*

3 Bill black: *Egretta garzetta.*
Bill yellow: 4.

4 Size larger, length 30–35 in.: *Egretta alba.*
Size smaller, length 19–25 in.: 5.

5 Head and breast heavily tinged orange-buff: *Bubulcus ibis* (breeding).
Plumage without buff tinge: 6.

6 Filmy ornamental back plumes extend beyond tip of tail: *Egretta intermedia* (breeding).
Ornamental plumes pointed and not reaching beyond tip of tail: *Demigretta sacra* (breeding, white phase).
Without ornamental plumes: immature *E. intermedia, Demigretta sacra.*

7 Size smaller, length 15 in.: *Butorides striatus.*
Size larger, length 18–30 in.: 8.

8 Throat to fore breast, white: *Notophoyx picta.*
Forehead, cheeks, and throat white: *Notophoyx novaehollandiae.*
White line on chin and throat: *Demigretta sacra* (slaty phase).
Fore neck variegated white, buffy, chestnut and black: *Dupetor flavicollis.*

9 Crown and back black: *Ixobrychus minutus* (adult).
Crown black, back yellowish brown: *Ixobrychus sinensis.*
Back streaked: *Ixobrychus* species.

### *Ardea sumatrana* (Raffles)

Giant Heron. Length 45 in. Adults: brownish grey, darker and greyer on back, paler on breast and abdomen, and with more or less grey white-tipped elongated pointed feathers on crest, neck, upper breast and in scapulars; iris and skin about eye yellow; bill black with some yellow in mandible; legs black. Wing 460 mm, tail 175 mm, exposed culmen 160 mm, tarsus 155 mm. Immatures: without the elongated

pointed feathers; feathers of body plumage margined with rufous; head and neck brown to rufous, more whitish on the throat.

RANGE Southern Asia to Australia; in New Guinea recorded in the lowlands and on several satellite islands.

NESTING [A flat stick nest in a tree; eggs two, light blue-green; size 70 × 48 mm. Australian data.]

REMARKS This is the only very large heron in New Guinea. In general it seems a scarce bird. None was found in the extensive marshes of the Fly River nor on the Sepik River, but on the lagoons of the Idenburg River we saw a dozen or so birds in a month's field work. They were solitary; fishing along the narrow, deep, forest-fringed waterways, or resting in the branches of the overhanging trees.

### *Notophoyx novaehollandiae* (Latham)

White-faced Heron. Length 24–29 in. Adults: white forehead, front of face and throat; rest of plumage grey, darker and more slaty on neck, paler slaty on back, and much paler and tinged buffy brown on breast and abdomen; grey scapulars pointed and elongate; grey feathers of lower neck slightly elongated and pointed, and tinged chestnut; iris yellow; skin about eye greenish yellow, bill black; legs greenish yellow. Male wing 320 mm, tail 135 mm, exposed culmen 85 mm, tarsus 100 mm. Female slightly smaller.

RANGE Lesser Sunda Islands and Celebes to New Guinea, Australia and New Zealand. In New Guinea there are not many records, but the species has been found at a number of widely separated areas, in the lowlands, and at 5,000 ft.

SUBSPECIES IN NEW GUINEA One, *novaehollandiae* (Latham).

NESTING [Solitary or a few nests in a loose group; nest a platform of sticks in a tree, often high, and not necessarily near water; eggs three to five, blue; size 45 × 36 mm. Australian data.]

REMARKS It is not obvious what the habitat requirements of the white-faced heron are in New Guinea. Several birds have been recorded near the coast in south New Guinea. The species was absent from the extensive lagoon and marsh system of the middle Fly River but a few were seen along the upper reaches. None was seen along the Idenburg lagoons nor the Sepik River in north New Guinea, but the species was not uncommon in the Balim Valley at 5,000 ft, where they were feeding about ponds and ditches in the garden land, while a few were seen along the Balim River itself.

### ***Notophoyx picata*** **(Gould)**

Pied Heron. Length 18 in. Adults: top of head and very long nuchal crest slaty black; all around the neck, chin, throat, and elongated, pointed plumes on forebreast white; rest of plumage slaty black with narrow, pointed scapulars somewhat greyer; iris and bill yellow; lores slaty; feet olive-yellow. Wing 230 mm, tail 80 mm, exposed culmen 65 mm, tarsus 75 mm. Immatures: white on top of head and in underpart of body.

RANGE Celebes to New Guinea lowlands, Aru Islands and northern Australia.

NESTING [Nest a platform of sticks in a tree; eggs three or four, colour blue-green; size 41 × 35 mm. Australian data.]

REMARKS When the savannahs about the big lagoons of the middle Fly River were burned in September, the pied heron appeared for the first time, when flocks of twenty to thirty birds came and fed over the burned grasslands. It was the most common heron of the middle Sepik River. Along the Idenburg River in April and May, this species did not frequent the marshes of the lagoons, but singly or in small parties fed along the sand-bars and on masses of floating vegetation in the stream. Its diet is varied, including insects, crustaceans, and frogs, but no fish have been recorded.

### ***Butorides striatus*** **(Linnaeus)**

Mangrove Heron. Length 15 in. Adults: top of head and elongated, narrow, nuchal crest slaty black with a greenish gloss; a short black line below eye; hind neck brownish grey; rest of upperparts grey or slaty, scapulars elongated, pointed, and more greyish, wing-coverts darker and with greenish gloss and pale brown or whitish margins; underparts grey or brownish grey, more or less streaked white on throat and breast; iris yellow; bill black; mandible greenish yellow; lores grey and yellow; feet greenish; yellower posteriorly. Wing 190 mm, tail 65 mm, exposed culmen 70 mm, tarsus 50 mm. Immatures: browner, paler below, spotted and streaked with buff and black.

RANGE South America, Africa and Eurasia to Australia and some Pacific islands; in New Guinea in the lowlands and on many satellite islands (absent from most of north New Guinea?).

SUBSPECIES IN NEW GUINEA Three:

a) *papuensis* (Mayr); Aru Islands, Vogelkop, and adjacent islands; a dark race.
b) *idenburgi* (Rand); Idenburg River, north New Guinea; a pale race with little brown.

c) *littleri* (Mathews); northern Queensland and south New Guinea (Setekwa River to Port Moresby district).

NESTING [A platform of sticks in a tree near water; eggs two, pale green; size 40 × 31 mm. Australian data.]



REMARKS The little mangrove heron was frequently found along the edge of muddy or marshy shores, often near shrubbery. When alarmed the bird flew ahead to perch in a dense shrub near the water's edge.

***Bubulcus ibis* (Linnaeus)**

Cattle Egret. Length 19 in. Adults: plumage white; in breeding season with lengthened ornamental orange-buff plumes on crown, back, and breast; iris yellow; bill yellow; legs dusky olive (soft parts more pinkish in breeding season?). Wing 255 mm, tail 90 mm, exposed culmen 60 mm, tarsus 85 mm.



RANGE Africa, southern Europe and southern Asia to the Philippines, Sunda Islands and Moluccas, has recently reached the Americas. A straggler to New Guinea where there are two records, of the eastern subspecies *coromandus* (Boddaert).

***Egretta alba* (Linnaeus)**

also known as *Cosmerodius albus*

Greater Egret. Length 30–35 in. Adults: plumage pure white, with (in breeding plumage) a long, filmy, ornamental tuft of white feathers with disintegrated webs on the upper back, these feathers reaching beyond end of tail; iris pale yellow; bill yellow; feet black. Male wing 380 mm, tail 145 mm, exposed culmen 110 mm, tarsus 155 mm. Female slightly smaller.

RANGE Warmer parts of the world; in New Guinea widespread in the lowlands.

SUBSPECIES IN NEW GUINEA One, *modesta* (Gray).

NESTING [In loose colonies, nest in reed bed or in trees, a platform of dead reeds or sticks; eggs three or four, bluish green; size 55 × 39 mm. Australian data.]



REMARKS The great egret was fairly common along the middle Fly River, feeding in shallow places along the river's shore, or walking on the floating mats of grass on the adjacent big lagoons. Birds are often solitary by the river; a lone great egret was sometimes accompanied by a single *E. garzetta*. However, in the lagoons, this egret sometimes fed, flew, and perched in trees in small parties of four or five individuals.

### *Egretta intermedia* (Wagler)

also known as *Mesophoyx intermedia*

Lesser Egret. Length 25 in. Adults: plumage white; in breeding plumage with a long, filmy, ornamental tuft of white feathers on upper back, these feathers extending beyond tip of tail, and another similar tuft, 6–7 in. long, on upper breast; iris pale yellow; lores and skin about eye pale yellow; bill yellow; front of tarsus and toes black, rest yellow; in breeding plumage the yellow becomes tinged with pink. Wing 290 mm, tail 120 mm, exposed culmen 80 mm, tarsus 105 mm.

RANGE Africa and southern Asia to Australia; in New Guinea found in the lowlands.

SUBSPECIES IN NEW GUINEA One, *plumifera* (Gould), which also occurs in Australia and the Moluccas.

NESTING [A stick platform in a tree; eggs four, pale green; size 45 × 32 mm. Australian data.]

REMARKS The floating grass beds of the lagoons of the middle Fly and Idenburg Rivers provided a favourite habitat for this species. The birds were common, often in flocks of 75 to 100, and usually wary.

### *Egretta garzetta* (Linnaeus)

Snowy Egret, or Little Egret. Length 20 in. Adults: plumage white; in breeding plumage with tuft of elongated, filmy, back feathers reaching to end of tail, a tuft of elongated, pointed (not filmy), ornamental feathers on breast, and two elongated, strap-like feathers (5–6 in. long) on nape; in non-breeding plumage, without ornamental plumes; iris and bare skin of face yellow; beak black, with base of mandible yellow; legs and toes blackish. Wing 250 mm, tail 80–100 mm, culmen 75–80 mm, tarsus 90–100 mm.

RANGE Southern Europe, Africa and southern Asia to Australia; in New Guinea in the lowlands and on some of the satellite islands.

SUBSPECIES IN NEW GUINEA One, *nigripes* (Temminck). This is also the subspecies of the Sunda Island area.

NESTING [A stick nest in a tree near water; eggs three to four, pale blue-green; size 47 × 36 mm. Australian data.]

REMARKS This egret was found feeding in the shallow margins of rivers, and also sometimes in the big open grassy marshes. It was usually solitary, but along the Fly River one of these birds would often associate with a great egret.

***Demigretta sacra* (Gmelin)**

Reef Heron. Length 24 in. There are two colour phases. White phase: plumage all white, with inner scapulars elongated, narrow and pointed as ornamental plumes, and similar plumes on forebreast in breeding plumage. Dark phase: plumage slaty black, ornamental plumes greyer, abdomen tinged brown, and throat with a white area. Iris yellow, bill slaty (yellow in white phase), legs yellowish green. Wing 310 mm, tail 110 mm, exposed culmen 90 mm, tarsus 70–80 mm.

RANGE Asia to Australia and eastern Polynesia; in the New Guinea region a coastal bird of general distribution.

SUBSPECIES IN NEW GUINEA One, *sacra* (Gmelin).

NESTING [Nest of sticks placed on the ground on an island, a bush, or a ledge of rock; eggs two to five, pale green in colour; size 43 × 35 mm. Australian data.]

REMARKS The presence of two types of plumage, one sooty grey, one white, is one of the most interesting aspects of this bird. Another is its liking for the sea-shore, occasionally mud-flats, and often coral reefs.

***Nycticorax caledonicus* (Gmelin)**

Rufous Night Heron. Length 23 in. Adults: upperparts chestnut except for top of head which is black, and a pair of narrow, long (5 in. or more), white plumes on nape; underparts white; sides of neck and face tinged cinnamon and line above eye whitish; iris yellow; bill black with mandible greenish at base; feet pale yellowish green. Immatures: upperparts dark brown, streaked and spotted with whitish; underparts white, streaked with greyish brown. Wing, male 290 mm, female 277 mm, tail 95 mm, culmen 80 mm, tarsus 78 mm.

RANGE From Java, Philippines, and Bonin Islands, to Australia, New Caledonia and Solomon Islands.

SUBSPECIES IN NEW GUINEA One, *hilli* (Mathews), which ranges from the Moluccas to Australia.

NESTING [Solitary or in colonies; a platform of sticks in a tree near water; eggs two to three, light bluish green; size 55 × 37 mm. Australian data.]

REMARKS In general, rufous night herons are nocturnal, spending the day sleeping in shady trees, and flying out to their feeding places, shallow margins of ponds and swamps, at night.

***Zonerodius heliosylus* (Lesson)**

Forest Bittern. Length 28 in. Adults: upperparts generally black, barred

with buff, but with lower back and rump white with dusky edgings to some feathers, and crown and nape black, chin and upper throat white, lower throat to breast broadly banded with black and buff; lower breast and abdomen white washed with buff, especially on flanks; iris yellow; bill black with base of mandible whitish; feet pale greenish. Wing 310 mm, tail 120 mm, bill 90 mm, tarsus 100 mm.

RANGE New Guinea lowlands (up to 1,000 ft), and the Aru Islands and Salawati. Lowland swamps and streams in forests.

NESTING Nest a substantial structure of sticks and twigs placed forty feet up in a tree in light forest by a wooded stream. Eggs not known; young, one, with yellowish white natal down. (One record.)

REMARKS This bittern appears to perch in small trees and to feed singly along waterways in the forest. Its recorded food included crayfish, crab, beetles, other insects, some small fish, a lizard, and a twelve-inch snake, without any decided preference being shown.

### *Ixobrychus sinensis* (Gmelin)

Chinese Least Bittern. Length 12 in. Adult male: crown black, hind neck reddish brown; back yellowish brown, rump grey; tail black; wing quills black, scapulars greyish brown, upper wing-coverts buff; underparts buffy white with some long semi-concealed, black, buff-edged feathers in sides of neck and breast; iris yellow; bill yellow, with black streak on culmen; feet yellow; wing 135 mm, tail 46 mm, culmen 51 mm, tarsus 44 mm. Adult female: similar but duller and slightly streaked. Immatures more streaked.

RANGE North China to India, and south and east to New Guinea and Guam; in New Guinea and some satellite islands, a lowland bird of grassy marshes.

NESTING [A solitary nest of grass among reeds or grass in swamps; eggs three to five, pale blue-green; size 33 × 24 mm. Asiatic data.]

REMARKS These are birds that skulk in the reeds. Perhaps the New Guinea examples of this species are winter visitors from the north. In March they were common in the reed beds of the Idenburg River lagoons. Rising water from the rains restricted their habitat there so it was easy, travelling by canoe, to find them.

### *Ixobrychus minutus* (Linnaeus)

Black-backed Least Bittern. Length 12 in. Adults: crown, back, rump and rectrices black; scapulars and remiges also black; upper wing-coverts buffy, white and chestnut; underparts buffy to ochraceous, sides of head and neck more chestnut, throat whitish and some black, buffy-

tinged feathers in side of neck and breast; iris yellow; bill yellow, with culmen black; legs yellow. Wing 130 mm, tail 43 mm, culmen 44 mm, tarsus 42 mm. Immatures duller and more streaked.

RANGE Europe, northern Asia, Africa, Australia, New Zealand, and south New Guinea, where recorded once, on middle Fly River.

SUBSPECIES IN NEW GUINEA The Australian one, *dubius* (Mathews), has been recorded.

NESTING [A basin-shaped structure of dead herbaceous material placed in reeds above water; eggs four, white; size 30 × 24·5 mm. Australian data.]

REMARKS The single New Guinea record from the middle Fly River lagoons was of a bird ready to lay, indicating breeding on the Fly River in September. No chinese least bitterns were found in these marshes.

***Dupetor flavicollis* (Latham)**

Black Bittern. Length 20 in. Adult male: upperparts black with a greenish, slaty, and bluish tinge; throat white washed with rufous and black along mid-line; front of neck varied with black, rufous chestnut and white; side of neck buffy yellow; breast and abdomen slaty black, more or less tinged brownish; iris brown to yellow; bill dark brown, with base of mandible whitish; feet dusky olive. Wing 230 mm, tail 80 mm, culmen 80 mm, tarsus 70 mm. Female: similar but duller and more brownish.

RANGE Southern Asia to Australia area; in New Guinea and satellite islands, a lowland bird.

SUBSPECIES IN NEW GUINEA One, *gouldi* (Bonaparte), of Moluccas-Australia-Bismarck Archipelago area.

NESTING A rough, fairly substantial structure of dead sticks and woody vines, placed a few yards up in a tree in or near water; eggs one to two, colour white; size 43 × 34 mm (two New Guinea nests); both sexes incubate the eggs.

REMARKS The black bittern was fairly common locally, and was usually solitary along the wooded edges of streams or marshes, and when alarmed, flew to perch in the forest.

## Family Ciconiidae *Storks*

*(Seventeen species, one in New Guinea)*

This family has representatives on every continent.

### ***Xenorhynchus asiaticus*** **(Latham)**

**Jabiru or Black-necked Stork.** Length 54 in. Adults: head and neck iridescent greenish blue-black with a patch of iridescent purple on nape; rest of underparts white; rest of upperparts white, except for iridescent greenish black median and greater upper wing-covert, inner secondaries, scapulars and tail feathers; iris yellow; bill black; feet pink. Wing 573 mm, tail 200 mm, culmen 320 mm, tarsus 323 mm. Immatures: mostly dusky brown with white on breast and abdomen.



RANGE Southern Asia; also northern Australia to New Guinea. In New Guinea, in the southern lowlands, from Merauke to Port Moresby.

SUBSPECIES IN NEW GUINEA The Australian one, *australis* (Shaw).

NESTING [A bulky structure of sticks placed in a tree; eggs two to four, white; size 73 × 53 mm. Australian data.]

REMARKS Singly, or in groups of two, three, or four, this stork was occasionally seen along the muddy coast of south New Guinea, and along the margins of lagoons in the grass-savanna country. Occasionally the birds rose and soared high in the air when the long legs, long outstretched neck, very heavy bill, and black and white plumage made a distinctive combination. Fish is said to be a major part of the diet in Australia, but a New Guinea bird was found to have eaten three snakes and many large insects.



## Family Threskiornithidae *Ib ses* and *Spoonbills*

*(Twenty-eight species, three in New Guinea)*

Ibises and spoonbills, of which there are about twenty-eight species, live in the warmer parts of the world. Two ibises and one spoonbill are known from New Guinea, and all occur in Australia, also. These birds live on muddy shores on the coast or interior waters, on flooded, grassy or marshy areas, where they walk about seeking their food of small animals such as fishes, crustaceans, and insects. These birds are usually found in flocks and nest in colonies.

The young have a coat of natal down, and are cared for in the nest by both parents until fledgling.

### Key to *Threskiornithidae* Species



1 Bill much enlarged, spoon-shaped at tip: *Platalea regia.*
Bill slender at tip: 2.
2 Plumage mostly white: *Threskiornis moluccus.*
Plumage brownish to blackish: *Plegadis falcinellus.*

***Platalea regia* (Gould)**
also known as *P. leucorodia regia*

Royal Spoonbill. Length 30 in. Adults: a nuchal crest present; plumage white; iris scarlet; bill black; feet black. Wing 355 mm, tail 110 mm, culmen 220 mm, tarsus 130 mm. Immatures: similar, but without nuchal crest, and with some brown or blackish in remiges.

RANGE Australia, rarely (as stragglers?), to New Zealand, Rennel Island, New Guinea and Sunda Islands (breeds in Java).

NESTING [In colonies, in reeds, or in trees over water; nest a platform of reeds or twigs; eggs three to four, white blotched with red-brown; size 68 × 43 mm. Australian data.]

REMARKS In Australia, this is a bird characteristic of rivers and lakes. While feeding, it walks along in shallow water, bill in the water, swinging its partly open bill from side to side, by which means it catches the small aquatic animals on which it feeds.

***Plegadis falcinellus* (Linnaeus)**

Glossy Ibis. Length 24 in. Adult male: looks black at a distance, but crown and side of head, mantle, wings and tail glossy greenish black with more or less coppery reflections, except flight feathers which are greenish only; neck all around, lesser upper wing-coverts, and under side of body dark chestnut-maroon; under tail-coverts black with purplish reflections; iris brown; bare skin of lores blue-grey; bill dark olive-brown; feet brown; wing 285 mm, tail 100 mm, culmen 140 mm, tarsus 97 mm. Female: similar, but somewhat smaller. Immatures: plumage generally dusky brown, the feathers of head and part of neck with white edgings, giving a streaked effect, and those of the back with greenish and some purple reflections.

RANGE Warmer parts of the world; in New Guinea, only in the south, from Merauke to Port Moresby; possibly only a non-breeding visitor from Australia.

SUBSPECIES IN NEW GUINEA One, *falcinellus* (Linnaeus), which ranges from Malaysia to Australia. The race *peregrinus* (Bonaparte) is not considered separable.

NESTING [In colonies, in trees growing in water; nest a platform of twigs; eggs three to four, deep greenish blue; size 53 × 36 mm. Australian data.]

REMARKS There are few New Guinea records. Elsewhere, this species is found in flocks on mudflats or marshes. The flocks, perhaps numbering from six to hundreds of birds, feed together and fly in long lines.

### ***Threskiornis moluccus*** **(Cuvier)**

White Ibis. Length 25 in. Adults: plumage white, except for greenish tips to primaries, and greenish black distal portion of inner secondaries which are lengthened and have the web of the feathers disintegrated; head and neck bare of feathers, and black in colour, with some pink on nape and hind neck; iris brown; bill black; feet pink. Wing 355 mm, tail 120 mm, culmen 160 mm, tarsus 100 mm. Immatures: neck covered with small, dusky feathers, and remiges and tertials white marked fuscous.



RANGE Moluccas Islands to Australia; in New Guinea, in the lowlands, and on Salawati and Waigeu Islands.

SUBSPECIES IN NEW GUINEA One, *moluccus* (Cuvier), the Moluccas form, though south and east New Guinea birds show an approach to the Australian race *strictipennis* (Gould).

NESTING [Nests in colonies, in marshland, in bushes, or on bent down reeds; nest a flat structure of sticks or reeds; eggs three to five, white; size 70 × 41 mm. Australian data.] A solitary, flimsy nest containing two white eggs being incubated by the male bird was seen in the crown of a coconut tree on Sele Strait by S. D. Ripley.



REMARKS Though recorded only a few times, locally this species may be common on mudflats, sand-bars or open grass expanses, but apparently it may move about as water levels change. On the middle Fly River, none was seen until the grass of the savannahs was burned, when small parties came and fed over the burned areas, apparently eating insects. On another occasion, in March, on the Oriomo River, where we did not otherwise see this species, we saw an evening flight of this bird. In the half hour before dark, we saw about 150 ibises in flocks of ten to twenty flying westward in direct flight about 300 ft up.



# Order 6 Anseriformes

## Ducks, Geese, etc.

*Two families, one in New Guinea*

### Family Anatidae *Ducks, Geese,* etc.

*(145 species, eleven in New Guinea)*

This family of some 145 species is of world-wide distribution, and there are eleven species in the New Guinea area. In general, ducks are birds of grassy marshes or swamps, swimming or walking along and sieving food (seeds, roots, or small animals) from the mud and water, or nipping off bits of green vegetation. Some species, however, dive for food. Some species sleep floating on the water, some stand on a bank or bar, while in New Guinea, six of the eleven species may perch on branches of trees. Most ducks fly well with rapid, beating flight, and often in flocks which adopt some formation such as a line or a V. The nest may be on the ground, in reeds over water, in the old nest of a hawk, or that of some other large bird, in a tree, or in a hole in a tree. In some species the female plucks down from her breast for a blanket-like lining for her eggs. Up to a dozen or more eggs may be laid. It is usual for only the female to incubate and to care for the young. These hatch down-covered, and in a matter of hours can follow the adult who cares for them for some time.

In many parts of the world, ducks are important game birds. In New Guinea, the distribution of these birds is very erratic, and when common, this condition is very local.

#### Key to *Anatidae* Species

1 Length more than 30 in.: *Anseranas semipalmata.*
Length less than 25 in.: 2.

2 Head and neck all white: *Tadorina radjah.*
Head and neck not all white: 3.

3 Back dark green, blackish, or brown, unpatterned: 4.
Back brownish or blackish, feathers with pale edges or bars: 6.

4 Length 20 in.; head and neck all brown: *Aythya australis.*
Length 13–14 in.; head and neck with much white: 5.

5 Flanks with conspicuous, crescent-shaped bars: *Nettapus pulchellus.*
Flanks without such conspicuous bars: *N. coromandelianus.*
6 Under wing-coverts and axillaries black: 7.
Under wing-coverts and axillaries white or black and white: 8.
7 Flank feathers with broad, pale, central streaks: *Dendrocygna arcuata.*
Flank feathers with large, pale spots: *D. guttata.*
8 Length 19–22 in.; side of head with two dark and two pale streaks: *Anas superciliosa.*
Length 15 in.; side of head with one pale streak, over eye: *Anas querquedula.*
Side of head without a conspicuous streak: 9.
9 Throat plain buffy white: *Anas gibberifrons.*
Throat greyish black, feathers edged with white: *Salvadorina waigiuensis.*

### ***Anseranas semipalmata*** **(Latham)**

**Pied Goose or Magpie Goose.** Length 35 in. Adult male: head and neck black; rest of underparts white; thighs black; foreback, middle and lesser upper wing-coverts and rump white; centre of back, greater wing-coverts, wing quills and tail black; a high knob on crown. Female: like male but smaller, and with knob on crown less developed. Immatures: dark parts of plumage brownish, mantle mixed black and brown, or all black; knob on head small. Adults: iris brown; bare skin of forehead and sides of head dull pink with irregular black spots; bill yellow, with black area near horn-grey tip; legs yellow. Male wing 445 mm, tail 170 mm, culmen 83 mm, tarsus 97 mm. Female wing 380 mm. In addition to the knob on the crown, another structural peculiarity is that the front toes are only partly webbed, contrasting with complete webbing of the three front toes in other ducks.

RANGE Australia and south New Guinea from Merauke area to Oriomo River area.

NESTING A large, flat, basin-shaped structure of grass stems among the grass of a shallow, fresh-water marsh. Eggs two to twelve, white; size 71 × 52 mm. (Merauke area.)

REMARKS The pied goose lives in swamps, feeds on vegetable matter, sometimes goes in large flocks, and often perches on the thin branches of tall trees. Occurrence and nesting apparently are irregular, depending on the rains and the state of the water. The species seems to be local in south New Guinea, having been found in only a few localities.

### ***Dendrocygna arcuata*** **(Horsfield)**

**Whistling Tree Duck.** Length 19 in. Adults: upperparts from crown and

hind neck to tail generally blackish brown to brownish black, but feathers on foreback heavily barred buff, those on mid-back and scapulars edged buffy to brownish buff, some upper tail-coverts bright chestnut; underparts, throat buffy white; upper breast buffy brown with small black spots; lower breast rufous; flanks rufous, with some feathers having a conspicuous, buffy white, black-edged, central stripe; lower abdomen mottled buffy white and brown; under wing black; iris red-brown; bill black; legs grey-black. Wing 210 mm, tail 54 mm, culmen 45 mm, tarsus 46 mm. Immatures: similar but duller.

RANGE Philippines to Java, Fiji Islands and Australia; in New Guinea in southern and eastern lowland marshes and along rivers.

SUBSPECIES IN NEW GUINEA One, the Australian form, *australis* (Reichenbach).

NESTING [In a depression amongst herbage on the ground; eggs six to fifteen, creamy white; size 51 × 35 mm. Australian data.]

REMARKS Both this species and *D. guttata* were common on the lagoons of the middle Fly River, and had similar habits.

***Dendrocygna guttata* (Schlegel)**

Spotted Tree Duck. Length 17 in. Adults: upperparts from crown and hind neck to tail generally blackish brown to brown, except for narrow buffy edgings to the squarish tips of the mantle, and white bars in the upper tail-coverts; side of head grey; throat and abdomen buffy white; breast fulvous brown, the feathers with white bars and spots; flank feathers black with large white spots; under wing black; iris brown; bill and feet dusky red. Wing 218 mm, tail 85 mm, culmen 43 mm, tarsus 49 mm.

RANGE Philippines and Celebes to Bismarck Archipelago, the Aru Islands, and widespread in the New Guinea lowlands in marsh, lake, and along rivers.

NESTING Said to be in a hole in a tree; eggs undescribed.

REMARKS This is the commonest and most widespread duck in New Guinea, and grassy waters seem its favourite habitat. The spotted tree duck is usually gregarious, going in flocks of a few birds up to several hundred. Sometimes the birds set on the grassy margins of lagoons. At evening the birds may fly, with whispering calls, to a common roost in some dead tree near the water's edge. Hundreds of birds may gather in such a place to spend the night.

***Tadorna radjah* (Lesson)**

White-headed Shelduck. Length 19 in. Adults: head and neck all around

white; rest of underparts white, except for a dark brown, finely barred or vermiculated, narrow breast band which joins the dark foreback, and grey vermiculated under tail-coverts; back and scapulars brownish black, finely barred or vermiculated with brown on the back; rump and tail black; upper wing-coverts white, the greater series with a black line near the tip; remiges black, but the outer edges of secondaries coloured so that the closed wing shows a patch or speculum of black, iridescent green, and chestnut, margined posteriorly with white; under wing-coverts black and white. Some specimens are more red-brown, others more blackish. Iris pale yellow; bill and feet pink. Male wing 274 mm, tail 122 mm, culmen 44 mm, tarsus 56 mm. Female wing 260 mm.

RANGE Moluccas to New Guinea and some neighbouring islands, including Aru and Fergusson, in lowlands; also in northern Australia.

SUBSPECIES IN NEW GUINEA One, *radjah* (Lesson), of the Moluccas area.

NESTING [In a hole in a tree; eggs six to twelve, white; size 59 × 41 mm.]

REMARKS A bird characteristic of coastal mudflats, margins of rivers, and coastal swamps. It may perch high on the larger branches of trees. Though widely distributed, its occurrence seems local, where it may be common.

***Anas superciliosa* (Gmelin)**

Black Duck. Length 19–22 in. Adults: upperparts from crown to tail brownish black, most of the features with narrow buffy or buffy white edgings giving a scaled pattern; upper wing-coverts like back, except that greater coverts are tipped with black; primaries brownish black, secondaries tipped with black, and with subterminal areas of metallic purple or green in outer webs to give a pronounced speculum; side of head with a pale line above eye, a black line through eye, a pale line below eye, and a black or dusky line from gape to near ear-coverts; throat buffy white, rest of underparts brown with feathers edged buff, under wing-coverts white; iris brown; bill grey, paler towards tip, with black nail; feet yellowish with dusky webs. Size varies with subspecies. Male wing 224–68 mm, tail 94–106 mm, culmen 44–53 mm, tarsus 42–47 mm. Female wing 221–55 mm.

RANGE Southern Sumatra to New Guinea and south Pacific islands to Tahiti and south through Australian area; in New Guinea widespread, from sea level to 12,000 ft, but local.

SUBSPECIES IN NEW GUINEA Two:

a) *rogersi* (Mathews) of Australia and southern and western New

Guinea; size larger: male wing 257–69 mm, female wing 246–54 mm.

b) *pelewensis* (Hartlaub and Finsch) of Pacific Islands to northern and central New Guinea; like *rogersi* but smaller; male wing 224–50 mm, female wing 221–43 mm.

NESTING [On the ground, in a tree in an old, large nest of some other bird, or in a hole in a tree; no nest built, but a lining of down added; eggs five to thirteen, greenish white; size 58 × 42 mm. Australian data.]

REMARKS Strangely, we did not find this duck on the extensive marshes of the Fly River, nor on those of the Idenburg River. However, in the Snow Mountains we found it fairly common along certain mid-mountain rivers, and on lakes and ponds in the alpine grassland. On the middle Sepik River it was also rather common, thinly distributed in ones, twos, and threes, in marshes and lagoons, and the species was not uncommon in the Wahgi Valley.

***Anas querquedula* (Linnaeus)**

Garganey. Length 15 in. Adult male in breeding plumage: crown and throat black, and a broad white line from over eye to nape; rest of head and neck brownish chestnut, finely streaked with white; back, rump and tail brownish black, the feathers with narrow pale borders; scapulars black, each with a broad, buffy, central stripe, except for the outer ones which are pale blue-grey like upper wing-coverts; speculum or wing mirror dull, pale green bordered front and rear with a rusty white bar; breast light brown with narrow wavy dark bars; rest of underparts white, coarsely vermiculated with black on flanks, finely vermiculated on posterior abdomen, and spotted on under tail-coverts; under wing-coverts black and white, axillaries white. Male in eclipse resembling female (see below), but somewhat brighter, and wing as in breeding male. Female: upperparts dark brown with light borders to feathers; white superciliary line and a thin, dark line from eye to nape; rest of side of head and neck finely streaked black and white; throat white; upper breast brownish mottled with rusty white; rest of underparts white with sides and abdomen and under tail-coverts with brown spots; upper wing-coverts greyish brown; speculum or wing mirror greyish brown with white border, front and back. Iris brown; bill and legs lead-grey. Male wing 193 mm, tail 66 mm, culmen 37 mm, tarsus 27 mm. Female wing 185 mm.

RANGE Breeds in temperate parts of Asia and Europe; winters to Africa, southern Asia, East Indies, and rarely to New Guinea and Australia.

REMARKS In March, we found about two dozen of these garganey in a

swamp opposite Daru Island, the only place where many species of duck were found: two tree ducks, the shelduck, pied goose, and the garganey. This contrasted with the paucity of duck on the extensive marshes of the middle Fly River, where only the two tree ducks and the green pygmy goose were found.

### *Anas gibberifrons* (Müller)

Grey Teal. Length 14–17 in. Adults: crown fuscous, feathers narrowly edged with buff; sides of head finely streaked fuscous and buffy white; throat white; rest of underparts with feathers dark brown broadly margined with pale brown; upperparts darker, grey brown, feathers with pale margins most conspicuous on foreback; wing speculum black externally, iridescent green on inner secondaries, narrowly tipped with white, and with a large patch of white on upper greater wing-coverts in front of speculum; iris red; bill blackish grey, nail black; legs grey. Male wing 190 mm, tail 85 mm, culmen 38 mm, tarsus 34 mm. Female wing 182 mm.

RANGE Andaman Islands, East Indies, New Guinea area, Rennel Island (Solomons), Australia and New Zealand.

SUBSPECIES IN NEW GUINEA One, *gracilis* (Müller).

NESTING [Often in holes in trees, or on the ground; eggs eight to twelve, creamy white; size 49 × 36 mm. Australian data.]

REMARKS There are only a few records of this species in New Guinea. It is to be expected on rivers and lakes in the lowlands, but two birds were found at about 10,000 ft on the marsh-edged Lake Habbema in the Snow Mountains.

### *Anas penelope* (Linnaeus)

European Widgeon. A single straggler of this Palaearctic duck has been recorded from Sorong, 23 January 1949.

### *Salvadorina waigiuensis* (Rothschild and Hartert)

Salvadori's Teal. Length 17 in. Adults: head and neck greyish black, feathers narrowly edged with whitish, especially on crown and throat; upperparts black, with narrow white bars; wings with a black and green speculum edged in front and back with a white bar; underparts pinkish buff, more or less spotted with black on breast and abdomen; sides of body and flanks broadly barred with black and white; under wing-coverts black and white, axillaries white; iris scarlet to dark red (male) or brown (female); bill black (male) or dark grey (female), yellowish below; feet yellowish grey with black webs. Male wing 198 mm, tail 106 mm, culmen 36 mm, tarsus 39 mm. Female wing 186 mm.

RANGE Mountains of New Guinea and Waigiu Island, from 2,800 to 12,800 ft.

NESTING Nest unknown; eggs white; size 55 × 42 mm.

REMARKS Salvadori's teal is a fairly common and widely distributed bird of grassy edged lakes, ponds, and quiet stretches of streams in the alpine grassland; rarely lower in the forest or mid-mountain grassland. The species was found singly or in pairs. When feeding, the birds dive for food or dabble along the shore, and when resting, come out on the bank to preen and sleep. When alarmed they may swim away or may fly.

***Nettapus coromandelianus* (Gmelin)**
also known as *Cheniscus coromandelianus*

Cotton Pygmy Goose. Length 13–14 in. Adult male: forehead, crown, and narrow ring about eye black, rest of head white; neck white with a complete collar of black encircling upper breast and upper back; rest of underparts white with sides and flanks finely and obscurely vermiculated with black, and vent and under tail-coverts blotched with black; upperparts of body: back, mantle, and tail glossy green separated from black collar by a white bar, and lateral tail-coverts finely vermiculated brown and white; remiges black with a broad white central area on each feather. Male in eclipse plumage like female (see below), but back and mantle darker. Female: similar to male, but dark upperparts duller; a black line through eye; base of neck and forebreast and foreback encircled with an area of finely barred black and white; wing patch on quills much less extensive; sides of body mottled with dusky. Iris red-brown; bill brownish black, yellowish below; legs blackish. Male wing 159 mm, tail 73 mm, culmen 23 mm, tarsus 24 mm. Female wing 152 mm.

RANGE Southern Asia to East Indies, northern New Guinea lowlands; also north-eastern Australia.

SUBSPECIES IN NEW GUINEA One, *coromandelianus* (Gmelin), the Asiatic race.

NESTING [In holes in trees; eggs eight to fifteen, creamy white; size 46 × 39 mm. Asiatic data.]

REMARKS This is the smallest of all ducks. They are said to be found usually in small parties on quiet, open water, near trees, such as along the Sepik River marshes; they feed among floating vegetation on seeds and leaves. They are said to roost in trees at night.

***Nettapus pulchellus* (Gould)**
also known as *Cheniscus pulchellus*

Green Pygmy Goose. Length 14 in. Adult male: top of head to below eyes dark brown barred with green; sides of head and throat white; neck all around glossy green; breast and abdomen white; upper breast and sides with crescent-shaped white and dark green bars giving a scaled pattern; under tail-coverts black; back, scapulars and upper wing-coverts dark, glossy green; upper tail-coverts dark, glossy green, more or less barred with white; remiges and rectrices black, secondaries broadly tipped with white giving a wing stripe; under wing-coverts black. Female: similar to male, but crown uniform brownish black; sides of head and throat speckled with white; hind neck black, sides and front of neck white with black bars. Iris brown; bill black, pink basally and at tip; legs black. Male wing 170 mm, tail 77 mm, culmen 26 mm, tarsus 26 mm. Female wing 167 mm.

RANGE Southern Celebes, Moluccas, New Guinea (Geelvink Bay, Vogelkop, and south New Guinea lowlands), also northern Australia.

NESTING [In hollows in trees or among reeds; eggs eight to thirteen, creamy white; size 44 × 35 mm. Australian data.]

REMARKS This was a common species in the lagoons on the middle Fly River, where open water and floating vegetation intermingled. It was not at all shy. In Australia, it is said to fly readily, to utter a whistled call, to feed mainly on green vegetation, and to perch on branches of trees.

***Aythya australis* (Eyton)**
also known as *Nyroca australis*

White-eye Duck. Length 20 in. Adult male: head and neck all around, breast and back deep brown; wings similar, but with a bronzy sheen and a wide white stripe on the flight feathers; flanks and abdomen brown; lower breast and under tail-coverts white; under wing-coverts white. Female: duller and browner, with some mottling on throat. Iris white (female, brown); bill greyish black with a blue-grey band near tip, nail black; legs grey. Male wing 218 mm, tail 63 mm, culmen 50 mm, tarsus 39 mm. Female wing 206 mm.

RANGE Java to Solomon Islands and the Australia–New Zealand area; in New Guinea, very local up to 10,000 ft.

SUBSPECIES IN NEW GUINEA One, *australis* (Eyton), also of Australia.

NESTING [Said to nest in reeds or to make a nest on a branch of a tree; a well made structure lined with down; eggs seven to twelve, creamy white; size 58 × 42 mm. Australian data.]

REMARKS On Lake Habbema in the Snow Mountains, we found several hundred of these ducks. They were very shy and the birds stayed well out in the lake where they fed by diving. Elsewhere, the species had been found in New Guinea only on Waigeu Island or Vogelkop, the locality being doubtful, and in the Balim Valley.

# Order 7 Falconiformes

## Hawks, Eagles, Falcons, etc.

*Five families, three in New Guinea*



These are the diurnal birds of prey, with hooked bills and curved, strong talons; in general they feed on other living animals but a few are carrion feeders. They seize their prey in their feet and tear it with their bills. The group has a nearly world-wide distribution. The females are usually considerably larger than the males, and the young, down-covered at hatching, are cared for in the nest by the parents for a long period.



Five families are recognized, of which three are represented in the New Guinea area. The families are recognized by anatomical characters as well as by the slight external differences we use in separating them for the purposes of this handbook.

### Synopsis of Families

1 ACCIPITRIDAE Hawks and Eagles, etc.; twenty-three species in New Guinea; length 10–39 in.; of variable shape, proportions, colour and habits, but all with hooked bill and curved claws, and without the combinations of special characters shown by the following two families. Most of the species of birds of prey seen in New Guinea belong to this family. See figure 9.

2 PANDIONIDAE Ospreys; one species; length 18–21 in.; wings long and narrow, tail short (less than one-half wing) and rounded; tarsus unfeathered; short, strong toes and claws powerful, outer toe reversible; under surface of toes covered with spicules. Unique in foot structure. Plumage of upperparts brown except for top of head mostly white; underparts white except for brown patch on breast. A fish-eater of sea coast and rivers, catching its prey by plunging feet first into the water.



3 FALCONIDAE Falcons; five species; length 10–21 in.; separated on external characters from other hawks by the long, pointed wing, plus the notched or toothed upper mandible. Four of the species are

rare or local, but one species, *Falco berigora*, the brown falcon, is often the commonest hawk of the open, mid-mountain valleys. See figure 10.

### Artificial Key to *Falconiformes*

Some variable species appear in more than one place.

Two groups: A Length 26–39 in.
B Length less than 26 in.

GROUP A Length more than 26 in.

1 Three choices:
   a) Above and below mostly blackish and under wing and tail without bars and tarsus feathered: 2.
   b) Underparts buffy brown to pale brown: 3.
   c) Underparts generally whitish sometimes with slight barring or streaks; tarsus naked: 4.

2 Some rufous in plumage and tip of tail wedge-shaped: *Uroaetus audax* (adult).*
   No rufous in plumage and tail tip rounded: *Spizaetus gurneyi* (adult).

3 Underparts brownish buff, tail long, barred, tarsus feathered: *Aquila gurneyi* (immature).
   Underparts pale, dull brown, tail short, mottled or streaked but not barred, tarsus naked: *Haliaeetus leucogaster* (immature).

4 Head and neck all around and terminal third of tail white, no barring in wing or tail: *Haliaeetus leucogaster* (adult).
   Top of head and neck with much brown, wings and tail conspicuously barred: 5.

5 Underparts white, unbarred (adult) or slightly barred on sides (immature) and tail with four to six distinct dark bars: *Harpyopsis novaeguineae.*
   Underparts whitish with some dark streaks and tail with ten or more fine dark bars: *Megatriorchis doriae* (female).

GROUP B Length less than 26 in.

1 Underparts all white, upperparts grey with black shoulders: *Elanus caeruleus.*
   Not so: 2.

2 Head and neck all around and breast white, rest of plumage maroon-red: *Haliastur indus.*
   Not so: 3.

3 Tail forked, plumage dull brown or red-brown above and below: *Milvus migrans.*
   Not so: 4.

* Immature (?) males have upperparts with much brown and tail with some narrow barring on outer third.

4 Plumage generally black except for small white spots above and below eye and irregular white area or mottling on throat and breast (and on abdomen in immature?): *Machaerhamphus alcinus.*
Not so: 5.

5 Throat and breast plain grey or ochraceous and abdomen whitish with about eight distinct bars, a small crest present: *Aviceda subcristata.*
Not so: 6.

6 Size medium, length 16–24 (one 26) in.: 7.
Size small, length less than 16 in.: 28.

7 Plumage all white: *Accipiter novaehollandiae* (female, white phase).
Not so: 8.

8 Throat black, rest of underparts uniform rufous brown, upperparts black with rufous collar on hind neck: *Accipiter melanochlamys* (female adult).
Not so: 9.

9 Throat and upper breast white or buffy contrasting with rest of upperparts which are closely barred black and grey or ochraceous: *Falco peregrinus* (female adult).
Not so: 10.

10 Throat grey, rest of underparts evenly and finely barred reddish brown and white; upperparts grey with rufous collar on hind neck: *Accipiter fasciatus* (female adult).
Not so: 11.

11 Throat white with a blackish streak down centre; rest of underparts streaked with brown, or breast brown with or without sparse white spots, rest of underparts irregularly barred brown and white: *Butastur indicus* (female).
Not so: 12.

12 Underparts predominantly white with or without dark pattern: 13.
Underparts predominantly blackish brown, brown, or reddish brown variously patterned: 22.

13 Top of head mostly white, underparts white except for a brown mottled patch on breast: *Pandion haliaetus.*
Not so: 14.

14 Upperparts black, underparts white with more or less fine black barring: *Accipiter meyerianus* (adult normal phase).*
Not so: 15.

15 Underparts white or reddish chestnut with bold black streaks, upperparts and side of head black with rufous edgings to some upper wing-coverts and rump feathers: *Accipiter buergersi* (normal phase).
Not so: 16.

* *Accipiter meyerianus* also has a black phase: solid black with some broad white barring on wing and tail quills.

16 Upperparts boldly barred black and grey: 17.
Not so: 18.

17 Long tail grey with three or four bold black bars, wing quills with two or three bold black bars: *Henicopernis longicauda.*
Long tail grey with ten or more fine black bars, wing quills with about seven distinct bars: *Megatriorchis doriae.*

18 White patch at upper base of tail (*Circus*): 19.
Not so: 20.

19 Upperparts black and silvery grey, underparts white, breast streaked black: *Circus spilonotus* (adult male).
Upperparts mostly brown, underparts buffy white completely streaked pale brown: *Circus spilonotus* (female).

20 Side of head solid black contrasting with white throat: *Falco peregrinus* (immature).
Side of head streaked brown: 21.

21 Wings long and broad, tarsus feathers: *Hieraaetus morphnoides* (female).
Wings short and rounded, tarsus naked: young of *Accipiter fasciatus, A. melanochlamys* and *A. novaehollandiae.*

22 White patch at upper side of base of tail: *Circus approximans.*
Not so: 23.

23 Wing quills predominantly black, without bars: 24.
Wing quills with distinct bars: 25.

24 Tail over 8 in.: *Haliastur sphenurus.*
Tail under 8 in.: *Haliastur indus* (immature).

25 Three choices:

a) Plumage wholly black except for white bases of hind neck feathers and whitish barring in wing and tail: *Accipiter buergersi* (black phase).

b) Underparts mostly dark dull brown with a little pale mottling, upperparts dull brown, barring in wing and tail ochraceous: *Falco berigora* (brown phase).

c) Underparts reddish brown, streaked with black or irregularly barred with whitish: 26.

26 Underparts red-brown with fine black streaks: 27.
Underparts reddish brown irregularly barred with whitish: *Accipiter novaehollandiae* (female adult, normal phase).

27 Tail barred grey and black: *Accipiter meyerianus* (immature).
Tail barred ochraceous and blackish: *Falco berigora* (normal phase).

28 Underparts uniform white: 29.
Underparts not all white: 30.

29 Upperparts white: *Accipiter novaehollandiae* (white phase).
Upperparts grey: *Accipiter poliocephalus.*

30 Underparts predominately white more or less patterned with brown or black: 31.
Underparts predominately brown or red-brown variously patterned with whitish or black: 34.

31 Wing long, when folded tip reaches to within one-quarter or less of tip of tail: 32.
Wing short, when folded reaching about to mid-point of tail: 33.

32 Throat white with central streak of black, rest of underparts streaked brown, tarsus naked: *Butastur indicus* (male immature).
Throat, breast, and abdomen streaked brown; tarsus feathered: *Hieraeetus morphnoides* (male).

33 Narrow black streaks restricted to throat and breast: *Accipiter poliocephalus* (immature).
Streaking and spotting of black and brown wider and of greater extent: immatures of *Accipiter novaeguineae, A. fasciatus, A. melanochlamys, A. soloensis.*

34 Wings short, rounded, when folded wing tip reaches approximately to middle of tail: 35.
Wing long, pointed, when wing folded tip reaches to within one-quarter or less of end of tail: 39.

35 Side of head and throat black, rest of underparts uniform rufous brown, upperparts black with rufous hind collar distinct: *Accipiter melanochlamys* (male adult).
Not so: 36.

36 Throat whitish, rest of underparts finely barred red-brown and whitish, upperparts grey with distinct rufous hind collar: *Accipiter fasciatus* (male adult).
Not so: 37.

37 Throat greyish white, rest of underparts rufous brown, obscurely barred with grey-white, upperparts slaty grey with only an indication of a hind collar: *Accipiter cirrhocephalus* (adults).
Not so: 38.

38 Throat whitish, breast grey washed rufous or rufous with obscure pale bars, abdomen whitish, unbarred, upperparts dark grey to slate: *Accipiter soloensis* (adults).
Upperparts brown to grey-brown or dark grey, underparts red-brown to ochraceous irregularly barred and mottled with white: *Accipiter novaehollandiae* (male adult).

39 Back red-brown, tail mostly grey: *Falco chenchroides.*
Upperparts generally grey or slaty, area on side of head black contrasting with white or buffy throat: 40.

40 Back slaty; breast and abdomen deep ochraceous, sparingly streaked with black (adult) or plentifully blotched black (immature): *Falco severus.*

Back blue-grey, breast rich ochraceous obscurely mottled or barred with dark brown or dusky and with some narrow blackish streaks: *Falco longipennis*.

## Family Accipitridae *Hawks, Eagles,* etc.

*(205 species, twenty-three in New Guinea)*

The Accipitridae contains about 205 species, well distributed over the world, of which twenty-three species occur in the New Guinea area. These vary in size from ten-inch-long sparrow hawks to eagles three feet in length. In behaviour, too, there is great variation. Some are forest birds, and sit in trees and watch for their prey; some beat back and forth over grass and swamp country for theirs; while others spend much time soaring. Some species eat a wide variety of living things; from insects to vertebrates, while others may specialize more narrowly; for example, on insects or on mammals. The usual hawk's nest is a big stick nest in a tree, but the marsh hawks or harriers may nest on the ground.

For identification see preceding key to Falconiformes, as well as the following synopsis of genera.

### *Synopsis of Genera*

1 ELANUS One species; length 12–13 in.; wing long and pointed; tail short (half of wing) and slightly forked; tarsus short, basal half feathered; bill slender. A grey and white bird with upper wing-coverts black in which it is unique.

2 MACHAERHAMPHUS One species; length 17–20 in.; wing long and pointed; tail short (about half wing or less) and square; tarsus short, basal third feathered; bill small, distal third compressed and knife-like (unique in this); plumage generally black, often with much white in throat and upper breast and above and below eye.

3 AVICEDA One species; length 14–16 in.; wing moderately long and broad; tail moderate (about three-fifths wing) and slightly rounded; tarsus short with upper third feathered; bill moderate, upper mandible with two small tooth-like notches; a black, spike-like crest; coloration of upper breast solid grey, lower breast and abdomen boldly barred blackish and white. Unique in having two notches in upper mandible, crest, and pattern of underparts.

4 HENICOPERNIS One species; length 20–24 in.; wing long, broad, and rounded; tail very long (three-quarters of wing) and rounded and with a few broad bars; tarsus short, with basal half feathered; bill small, brown in colour; plumage generally dark above and whitish with black striping below. Most likely to be confused with *Megatriorchis* but note bill colour, short tarsus and few bars in tail.

5 MILVUS One species; length 19–21 in.; wing rather long and narrow; tail about three-fifths of wing and deeply forked (unique in this); tarsus short, basal third feathered; bill rather small; coloration generally dark or reddish brown with black stripes on underparts; wing and tail without distinct barring.

6 HALIASTUR Two species; length 16–23 in.; wing rather long and broad; tail moderate (half to three-fifths of wing) and rounded; tarsus moderate, basal third feathered; coloration distinctive: maroon-red with head and breast white, or generally brown with broad pale streaks on breast.

7 ACCIPITER Seven species; length 10–22 in.; wing short and rounded; tail long (three-quarters to four-fifths wing); when folded wing tip reaches only to middle of tail; tarsus long and slender, mostly unfeathered. Flight is distinctive: alternating rapid wing beats with short glides.

8 MEGATRIORCHIS One species; length 20–27 in.; wing long and broad; tail long (equals wing) and rounded; tarsus very long, with basal third feathered, and claws large; bill large, black in colour; tail with many (about fourteen) narrow bars. (To be confused only with *Henicopernis* but note bill colour, tarsus length, and tail barring.)

9 BUTASTUR One species; length 15–19 in.; wing rather long and broad; tail rather short and rounded; tarsus short and feet and claws small; bill moderate, black with yellow base; plumage: upperparts dark brown; throat whitish with dark central stripe; breast nearly solid brown; abdomen white with bold brown bars.

10 HARPYOPSIS One species; length 30–35 in.; wing rather rounded; tail very long and rounded; tarsus long and naked and feet large and powerful; bill large.

11 SPIZAETUS One species; length 29–34 in.; wing long and broad; tail rounded; tarsus feathered to toes and feet powerful; bill powerful; plumage may or may not be all black.

12 HIERAAETUS One species; length 15–19 in.; wing long and broad; tail square; tarsus feathered to toes.

13 UROAETUS One species; length 30–39 in.; wing long and broad; tail wedge-shaped with central feathers much the longest and more than half wing; tarsus feathered to toes; plumage generally blackish brown with some rufous; often to be found soaring over savannas of south New Guinea.

14 HALIAEETUS One species; length 27–31 in.; wing long and broad; tail rounded; tarsus naked; adult plumage with head, underparts, and terminal half of tail white; a fishing eagle of sea coast and rivers.

15 CIRCUS Two species; length 18–23 in.; wing long and rather narrow; tail long; tarsus long and unfeathered; feet small; bill small;

plumage brownish or greyish and white or grey, black, and white; white patch on rump; seeks prey by flying and sailing low over grass or marsh.

***Elanus caeruleus* (Desfontaines)**

Black-winged Kite. Length 12–13 in. Adults: upperparts pale grey becoming whitish on forehead; lores, faint line over eye, lesser and median wing-coverts (forming a prominent wing patch) blackish; wings otherwise grey; central tail feathers grey; rest of tail, under wing-coverts, and whole underparts white; iris red; bill black; cere yellow; feet light yellow. Male wing 275 mm, tail 126 mm, exposed culmen 16 mm, tarsus 28 mm. Female slightly larger.

RANGE Except for Australia, nearly cosmopolitan in the warmer parts of the Old World.

SUBSPECIES IN NEW GUINEA One, *wahgiensis* (Mayr and Gilliard), known only from the Wahgi Valley in the eastern highlands.

NESTING [A large nest of sticks in a low tree; eggs three to five, white heavily splotched with brown on the larger end; size from 35 × 28·5 mm to 43 × 33 mm. African data.]

REMARKS Found in the tree-dotted grasslands of the mid-mountain valleys. The type and only known specimen of the New Guinea form was taken from the top of a solitary Bulolo Pine growing in a patch of second-growth forest. Two years later Gilliard saw and photographed another individual as it came many times to perch on the top of a dead tree overlooking bushy grasslands in the same valley. [In flight this hawk is buoyant and kestrel-like. It hovers occasionally and drops sometimes from a considerable height upon its prey, presumably small mammals and lizards. African data.]

***Machaerhamphus alcinus* (Westerman)**

Bat Hawk. Length 17–20 in. Adults: generally blackish brown, with a prominent nuchal spike-like crest, with vivid stripes above and below eye forming an incomplete white ring; throat and upper breast mostly white; the only species with a broad gape contrasted with a small blade-like edge on upper edge of maxilla; iris chrome-yellow(?); bill black; cere bluish grey(?); feet greyish white(?). Male wing 348 mm, tail 171 mm, exposed culmen 20 mm, tarsus 58 mm. Female larger: wing 374 mm.

RANGE Africa, Madagascar, Malaysia and New Guinea.

SUBSPECIES IN NEW GUINEA One, *papuanus* (Mayr).

NESTING [Nest a cup of large sticks lined with twigs and green leaves, placed fairly high in a large tree in dense woodlands; eggs two, bluish green with purplish smudges and dark specks; size from 61·5 × 45·5 mm to 64 × 47 mm. African data.]

REMARKS [Usually very uncommon to rare throughout its extensive range, the bat hawk is found along edges of lowland rivers and streams and over forest clearings. Observations made elsewhere indicate that it usually hunts by twilight and may even hunt on moonlit nights. Bats seem to be its usual food but it also takes swiftlets, swallows and other small birds. This hawk hunts in the manner of a giant flycatcher; flying out from a high exposed perch, circling and then returning to the same perch. In flight it moves swiftly with much gliding and probably seizes its prey in its talons and then gulps it down in flight. African data, mostly from J. P. Chapin.]

***Aviceda subcristata* (Gould)**

Crested Lizard Hawk. Length 14–16 in. Adults: upperparts, wings and tail grey to blackish grey, becoming lighter more ashy grey on hind neck, upper back and basal two-thirds of tail, and more dull brownish on inner secondaries and lower back; one or two narrow basal bars and broad black tip to tail; head all round grey, more sooty grey on crown; the latter with a small black crest; remainder of head, throat and upper breast solid grey; breast and abdomen buffy white with about a dozen bold blackish or brown bars; lesser under wing-coverts, lower abdomen and under tail-coverts chestnut-brown; wing below grey with bold blackish bars; tail below with two or three bold black bars; iris lemon-yellow; bill slate-blue below and blackish above; cere slate-black; feet greenish white to chalk-white. Male wing 291 (278–316) mm, tail 180 mm, exposed culmen 19 mm, tarsus 37 mm. Female larger: wing 300 (287–334) mm, tail 186 mm. Immature: throat and upper breast whitish washed with cinnamon; lower breast and abdomen ochraceous white with bold dark brown bars; mantle dark brown feathers edged with reddish brown; crown black with short crest; tail as adult.

RANGE Lesser Sunda Islands and the Moluccas eastward through New Guinea, the Bismarck Archipelago and the Solomon Islands, and south through Australia; in New Guinea found in the lowlands.

SUBSPECIES IN NEW GUINEA Four fairly similar ones:

a) *stenozona* (Gray); Aru Islands, Western Papuan Islands (Misol, Salawati), and western New Guinea (east in north to Geelvink Bay, in the south to Fly River); male wing 290–303 mm; female wing 296–314 mm, and barring of underparts brownish black.
b) *obscura* (Junge); Biak Island; like *stenozona* but smaller; male wing

278–94 mm; female wing 287–300 mm, and upperparts darker and barring on under wing more pronounced.

c) *waigeuensis* (Mayr); Waigeu Island; like *stenozona* but larger, female wing 314–19 mm, and barring of underparts rufous brown.

d) *megala* (Stresemann); D'Entrecasteaux Archipelago (Fergusson and Goodenough Islands) and eastern New Guinea (west in north to Mamberamo River and Japen Island, in south to Port Moresby area); like *stenozona* but larger, male wing 298–316 mm, female wing 314–34 mm.

NESTING [Nest of sticks and twigs, lined with leaves; placed as high as sixty feet on horizontal branches; eggs three to four, pale bluish white; size 42·5 × 34·5 mm. Australian data.]

REMARKS The crested lizard hawk was uncommon and found singly or in pairs in a variety of habitats: flying over the forest or perched in treetops, circling about garden clearings and second growth forest or perched in commanding dead trunks there, perched in trees along waterways, and in the savanna, and it has been recorded circling low over open country rather like a marsh-hawk (*Circus*). It has also been found in mangroves. Its recorded food includes large insects such as grasshoppers, locusts, and caterpillars (twelve times), frogs (twice), lizards (twice), snake (once).

### *Henicopernis longicauda* (Garnot)

Long-tailed Buzzard. Length 20–24 in. with a short, full nuchal crest. Adults: upperparts generally brownish black, the head and neck with semi-concealed white of feather edges showing, the feathers of mantle with a few broad grey bars and grey tips; tail with about four broad black bars and four broad grey bars and a narrow grey tip; wing quills black with two or three broad grey bars and narrow pale tips; underparts including some wing-coverts yellowish white with distinct black streaking, heaviest on breast; under surface of wing quills grey with two or three broad black bars; under surface of tail with three broad black bars and three broad grey bars and a narrow grey tip; iris orange-yellow; bill and cere bluish white with a black tip; feet bluish white. Male wing 401 (338–420) mm, tail 313 mm, exposed culmen 22 mm, tarsus 57 mm. Female larger: wing 420 (349–439) mm, tail 332 mm.

RANGE Aru Islands, Western Papuan Islands, Japen and all New Guinea. Found in lowlands up to 5,800 ft.

SUBSPECIES Three, two of which are quite distinct:

a) *longicauda* (Garnot); Salawati, Batanta and all New Guinea; dark areas of upperparts blackish; female 22 in. or longer; male wing 380–420 mm; female wing 395–439 mm.

b) *fraterculus* (Stresemann and Paludan); Japen Island; doubtfully distinct from *longicauda*; upperparts somewhat browner.
c) *minimus* (Junge); Aru Islands, Misol, Waigeu and Biak Islands; like *longicauda* but decidedly smaller (female 21 in. or less); male wing 338 mm; female wing 349 mm, and dark areas of upperparts browner.

REMARKS Presumably the forest canopy is the normal habitat of this buzzard; where it finds the insects which are its usual food, and above which it soars. However, most of the individuals of this rather uncommon species which we have recorded were seen from clearings for the obvious reason that it is only from such places that a man has much of a view. When soaring, the large size, the rounded, boldly barred, deeply 'fingered' wings, and the immense, boldly barred tail are distinctive. The tail is constantly tilted as the soaring bird flaps and sails, continually changing direction. Evidently the method of feeding is unusual for a New Guinea hawk because one bird had eaten the egg of a small bird and a quantity of wasps and their larvae. Four other specimens had eaten other insects. However, if the buzzard reaches into crevices for its food, it is surprising that it should have such a short tarsus. It is said sometimes to alight on the ground. The men of the mid-mountains of the Wahgi Valley frequently wear the tail feathers of this species in their head-dresses.

***Milvus migrans* (Boddaert)**

Black Kite. Length 19–21 in. The only New Guinea hawk with a forked tail. Adults: upperparts blackish brown, paler and more greyish brown on wing-coverts, head and neck, also head and neck streaked with black; wing quills uniform black; tail dark brown with about ten obscure blackish bars; side of head and throat pale greyish brown with narrow black streaks; rest of underparts dull chocolate-brown with narrow black shaft streaks, heaviest on breast; under surface of wing quills blackish mottled with grey basally; under surface of tail greyish with seven to ten narrow obscure bars; iris brown with yellow halations; bill black; cere and gape yellow; feet yellow. Male wing 382 mm, tail 230 mm, exposed culmen 22·5 mm, tarsus 48 mm. Female larger: wing 398 mm, tail 245 mm. Immature: lighter, more rusty brown and usually streaked with buff and reddish brown.

RANGE Europe, Africa, Asia, Malaysia (Borneo), Lesser Sunda Islands, Timor, Celebes, New Guinea, Bismarck Archipelago, and Australia.

SUBSPECIES IN NEW GUINEA One, *affinis* (Gould); Lesser Sunda Islands, Timor, Celebes, Australia, New Britain and eastern New Guinea (west in south to Yule Island; west in north to Humboldt Bay and Lake Sentani; also Fergusson Island). Found in lowlands up to 5,300 ft.

NESTING [Nest: an old hawk or crow nest relined with sticks and soft bark; eggs two or three, whitish, sparsely spotted and blotched with brown; size 51 × 49 mm. Australian data.]

REMARKS The long-winged, black kite is usually uncommon or rare, but occasionally it is abundant in large nomadic flocks over bushy grasslands and along the coasts and larger rivers and it comes to the vicinity of grass fires. One or two were infrequently seen, flying buoyantly, sailing and hovering intermittently, over grasslands fringing the airfields behind Port Moresby. The food of this species is chiefly rodents and insects, including insects picked from the surface of rivers and bays and insects caught in the feet and eaten in flight. In many parts this bird is known as a scavenger.

### Key to *Haliastur* Species

1 Maroon-red with white head and breast: *H. indus.*
Not maroon-red and white but brown with pale central striping on breast: 2.

2 Tail more than 8 in.: *H. sphenurus.*
Tail less than 8 in.: *H. indus* (immature).

### *Haliastur indus* (Boddaert)

Brahminy Kite or Red-backed Kite. Length 16–17 in. Adults: head, neck all round, upper back, middle and upper breast white; remaining upper parts, wings (except black primaries), tail (except white tip) and abdomen bright chestnut-brown; back streaked narrowly with black; undersurface of wings black distally, rufous basally; undersurface of tail whitish washed rufous; iris brown; bill pale greenish blue; gape and base of lower mandible blue-grey; cere yellow; feet yellowish with black nails. Male wing 350 (348–64) mm, tail 178 mm, culmen from base 22 mm, tarsus 43 mm. Female slightly larger. Immature: the white is replaced by dull brown streaked with buff; the chestnut replaced by dark brown; wings and tail above nearly black, wings below distally black, basally mixed brown and grey.

RANGE India east to south China and through the Malay Archipelago to New Guinea, Bismarck Archipelago, Louisiade and Solomon Islands, and Australia; in New Guinea common in lowlands and rarely up to 7,500 ft.

SUBSPECIES IN NEW GUINEA One, *girrenera* (Vieillot); Moluccas, New Guinea and adjacent islands, Bismarck Archipelago, Solomon Islands and Australia.

NESTING [A stick nest in coastal mangrove swamps; eggs one or two, bluish white to pale green with a few brownish marks; size 57 × 43 mm. Australian data.]

REMARKS This broad-winged kite, with its unmistakable colour pattern, favours open country, especially clearings, edges of the forest, edges of rivers, and the seashore where it sits on conspicuous perches in the trees or soars lazily about, sometimes alone, sometimes two, three or four together. Elsewhere in its range this kite is noted as a hanger-on of villages and towns and as a scavenger. Here in New Guinea the birds may do some scavenging and the many small fish one bird had eaten may actually be carrion, but the species is known to catch fish. For the most part in New Guinea this species probably catches living prey of which a wide variety has been recorded here; including locust, mantids, grasshoppers and other insects, lizards, frogs, small snakes, and mice.

### *Haliastur sphenurus* (Vieillot)

Whistling Kite Length 21–23 in. Adults: generally mottled pale and dark brown with blackish wing quills; upperparts darker; head and throat usually paler; breast usually darker, the feathers with broad pale centre streaks; iris russet-brown; bill greyish brown; cere dark grey; feet greyish white. Male wing 399 mm, tail 243 mm, exposed culmen 26·5 mm, tarsus 59·5 mm. Female larger: wing 404 mm, tail 252 mm. Immature much like adult.

RANGE New Guinea, Solomon Islands, Australia, Tasmania, and New Caledonia.

NESTING [Nest, a bulky structure of sticks lined with fresh leaves, placed high in a fork; eggs two to three, bluish white sparsely spotted or blotched with brown; size 57 × 44 mm. Australian data.]

REMARKS A common to abundant species in lowland savannahs and less common along the edges of large waterways; sometimes common in harbours. In the savannahs of south New Guinea near Dogwa, often ten to thirty birds were in sight at once, sailing over the savannah. As many as ten to twenty sometimes settled in trees near a dead wallaby and several went to the ground to feed together on the carcass. There the whistling kite fed almost exclusively on putrid meat of wallabies, and probably never killed its own prey. In late October, 1958, near the wharf at Lae, several early morning counts were made before the birds left their sleeping roost. The largest count was twenty-four birds in a small area in the tops of vine-enshrouded trees twenty to thirty feet above the ground and just inside the beach-edge forest. The birds were sunning themselves with spread wings at about 8 a.m. Later they were heard calling, a high-pitched wavering whistle, not much in volume. When feeding the birds flew close over the surface of the bay and delicately seized floating carrion with their extended

legs. They then dangled the legs forward under the breast and bent the head down to tug at the food which they ate in full flight.

**Key to *Accipiter* Species**

1 More than 18 in. long: 2.
Less than 18 in. long: 3.
2 Underparts mostly white with some narrow black barring; rarely all black: *A. meyerianus*.
Underparts mostly reddish brown with bold black streaks; rarely solid black: *A. buergersi*.
3 Underparts nearly or completely solid white: 4.
Underparts not as above: 5.
4 Solid white above and below: *A. novaehollandiae* (white phase).
Solid white below, grey above: *A. poliocephalus*.
5 Underparts whitish with bold black striping: *A. poliocephalus* (subadult), *A. melanochlamys* (subadult).
Underparts with brown in plumage: 6.
6 Breast solid or nearly solid reddish brown: 7.
Underparts not as above: 10.
7 Throat blackish: *A. melanochlamys*.
Throat pale buffy or grey, often with some dark central streaking: 8.
8 Less than 13 in.: 9.
More than 13 in.: *A. novaehollandiae*.
9 Lower abdomen with brown barring: *A. cirrhocephalus*.
Lower abdomen solid whitish: *A. soloensis* (adult).
10 Underparts narrowly barred: 11.
Underparts not narrowly barred: 12.
11 More than 13 in. long: *A. fasciatus* or a subadult of 12.
Less than 13 in. long: *A. cirrhocephalus* or a subadult of 12.
12 Underparts whitish striped or spotted with brown: *A. soloensis* (subadult), *A. fasciatus* (subadult), *A. cirrhocephalus* (subadult), *A. novaehollandiae* (subadult).

***Accipiter meyerianus* (Sharpe)**

Meyer's Goshawk. Length 19–22 in. Adults, normal phase: upperparts, side of head and sides of neck and upper surfaces of wings and tail black to blackish brown; semi-concealed bases of feathers of hind head and nape white; tail narrowly tipped with grey; malar region, throat and rest of underparts white with much narrow black shaft streaking and with indistinct barring and spotting on breast and under wing-coverts; abdomen and under tail-coverts clear white; underside of wing and tail quills grey; iris reddish brown; bill greyish black with a yellow base; feet yellow. Adults, black phase: entirely black, including under wing-coverts but bases of nape feathering white; wing and tail quills

obscurely barred as in normal phase. Male wing 305 (295–315) mm, tail 205 mm, culmen 25 mm, tarsus 74 mm. Female larger: wing 319 (319–342) mm, tail 227 mm. Immature: head and neck blackish washed with bright brown; back dark, the feathers with narrow brown edges; underparts buffy chestnut with narrow black streaking.

RANGE Moluccas (Ceram, Ceramlaut, Boano, Halmahera), New Guinea (Japen Island and Kratke Mountains), New Britain and Solomon Islands.

REMARKS Meyer's goshawk, apparently a rare species of the lowland and mid-mountain forests, has been recorded from only two localities in our area. One specimen had eaten a large bird. When both are in the black phase the adult is very similar to Buerger's goshawk.

***Accipiter buergersi* (Reichenow)**

Buerger's Goshawk. Length 17–21 in. Adults, normal phase: upperparts generally blackish with much reddish brown edging on upper wing-coverts and some rump feathers; crown and sides of head black; feathers of nape black with white bases and forming a small crest; wings and tail with flight quills black with narrow, indistinct brownish or greyish bars; lores pale; entire underparts white, with bold black streaks (and bars on under wing-coverts and shanks); shanks with some brown barring and spotting; wings and tail below blackish with whitish barring. Adults, black phase: plumage all black except for white bases of hind neck feathers; underside of wing and tail quills barred as in normal phase. Iris yellow; bill blackish with a dark grey tip; cere, gape, and facial skin light yellowish green; feet dull greenish yellow with blue-grey nails. Male wing 292 mm, tail 208 mm, exposed culmen 20 mm, tarsus 72 mm. Female larger: wing 319 mm, tail 207–28 mm. Immature: upperparts generally rich chestnut-brown to warm brown with prominent black centres and streaks; head all round chestnut with narrow black streaks, paler on throat.

RANGE Mountains of eastern New Guinea (Sepik and Hagen Mountains, Huon Peninsula, south-eastern New Guinea). From 1,900 to 5,000 ft.

REMARKS A rare, little known species which appears to be confined to the lower mountain forests.

***Accipiter novaehollandiae* (Gmelin)**

Grey or White Goshawk. Length 13–19 in. Adults, coloured phase: upperparts brownish grey to dark grey sometimes barred; underparts and under wing-coverts generally pale to rich ochraceous brown, sometimes with narrow pale barring; throat and sides of head usually powdery grey; wing and tail quills below buffy grey to pale grey

sometimes with narrow blackish barring. Adult, white phase: generally white with skin around eyes dull greenish grey. Iris corn yellow; bill black; cere, gape, and eye-ring orange-yellow; feet orange-yellow. Male wing 217 (173–234) mm, tail 159 mm, exposed culmen 17 mm, tarsus 60 mm. Female larger: wing 265 (up to 281) mm, tail 205 mm. Immature: upperparts generally brownish; underparts generally whitish or pale ochraceous with bold barring, but this barring sometimes may be lacking.

RANGE Eastern Islands of the Malay Archipelago eastward to New Guinea, Bismarck Archipelago, Admiralty Islands, Solomon Islands, D'Entrecasteaux Archipelago, Louisiade Islands, Australia and Tasmania.

SUBSPECIES IN NEW GUINEA Four; the geographical variations seem not to be adequately understood and are complicated by other plumage variations.

a) *leucosomus* (Sharpe); Aru Islands, western Papuan Islands, Salawati, Waigeu, islands of Geelvink Bay (Numfor and Japen), all of New Guinea, Trobriand Islands, Woodlark Island, Bonvouloir Islands (East Island); a large dark-backed, ochraceous-breasted race; male wing 217 mm.
b) *misoriensis* (Salvadori); Biak Island, Geelvink Bay; like *leucosomus* but much smaller; male wing 173 mm.
c) *pallidimas* (Mayr); Fergusson and Goodenough Islands, D'Entrecasteaux Archipelago; like *leucosomus* but paler below and generally with underparts narrowly barred; male wing 227 mm.
d) *misulae* (Mayr); Misima (St Aignan) and Tagula (Sudest) Islands, Louisiade Archipelago; like *leucosomus* but larger and more heavily barred below; male wing 234 mm, female wing 281 mm.

NESTING [Nest a large saucer of sticks lined with leaves in a tall tree; eggs two, bluish white, sometimes sparsely marked with brown; size 41 × 38 mm. Australian data.]

REMARKS This species is generally fairly common and usually found alone or in pairs in lowland forests, forest edges, savannahs, edges of streams and over grassy marshes. It flies slowly in straight lines or in circles and occasionally hovers. It may repeatedly drop into swamp grass in quest of small birds, mammals, lizards, small snakes and large insects such as grasshoppers. Only a small proportion of the New Guinea population is white and the same holds true for Australia, but in Tasmania virtually the entire population is white.

### *Accipiter fasciatus* (Vigors and Horsfield)

Australian Goshawk. Length 12–17 in. Adults: upperparts including top

and sides of head brownish grey to dark bluish grey with a complete collar on the hind and sides of neck rufous brown; upper surface of flight quills dark grey to sooty with some narrow blackish barring on inner webs; underparts including under wing-coverts whitish barred palely with vinaceous brown to rich rufous brown; throat usually nearly clear pale grey; upper breast sometimes solid rufous brown; wing and tail quills below pale with some indistinct barring; iris yellow; bill slate to black; cere pale green; lores greenish yellow; eye-ring yellow; legs pale yellow to chrome. Male wing 229 mm, tail 167 mm, exposed culmen 15 mm, tarsus 62 mm. Female much larger: wing 255 mm, tail 189 mm. Immature: brown above often without rufous on the collar; underparts generally pale cinnamon or whitish with much broad bold brown to reddish brown striping and barring.



RANGE Indian Ocean (Christmas Island), eastern islands of Malay Archipelago, New Guinea, Australia, Norfolk Island (?), New Caledonia and Fiji Islands; from sea level to 5,500 ft.

SUBSPECIES IN NEW GUINEA Two rather similar races:

a) *polycryptus* (Rothschild and Hartert); eastern lowlands of New Guinea west in south to Angabunga River and in north to Sepik River valley; abdomen of adult usually barred with rich rufous brown.

b) *dogwa* (Rand); southern New Guinea from Merauke district to the Oriomo River; like *polycryptus* but abdomen much paler, more white with pale vinaceous brown barring.



NESTING [Nest: an abandoned crow or hawk nest to which is added green leaves; or a self-built nest of sticks. Eggs two to four, rarely five, white, spotted and blotched with reddish brown; size 47 × 37 mm. Australian data.]

REMARKS Usually this goshawk is a rather uncommon, shy resident of forest savannahs and grassy stream edges. Most frequently it is found perching quietly in a savannah tree. When flushed it often drops nearly to the ground and then flies off low through the savannah, flapping and sailing, then rising abruptly to another perch. The Australian goshawk feeds primarily on lizards, small snakes, large insects such as grasshoppers and centipedes. It occasionally eats small birds.

### *Accipiter poliocephalus* (G. R. Gray)



New Guinea Grey-headed Goshawk. Length 12–15 in. Adults: upperparts from crown and sides of head and neck to mid-back ashy grey; remaining upperparts dark grey; wing quills above dark grey to sooty blackish; tail quills dark grey, outer ones with some indistinct blackish

barring; whole underparts and under wing-coverts whitish often washed with grey on sides of upper breast; wing quills below mostly grey with whitish inner edges and some dark notching and barring; iris dark brown; bill black; cere and base of bill below cere, also bare skin of face, orange; feet orange-yellow; nails black. Male wing 196 mm, tail 148 mm, exposed culmen 16 mm, tarsus 62 mm. Female larger: wing 215 mm, tail 165 mm. Immature: generally sooty brown above with some irregular whitish markings on the hind neck; underparts as in adult but with bold narrow blackish central striping on anterior half of body.

RANGE Aru Islands, Western Papuan Islands (Misol, Waigeu, Batanta, Salawati), Japen Island of Geelvink Bay, all New Guinea, D'Entrecasteaux Islands (Fergusson Island), and Misima Island. Found in lowlands up to 3,200 ft.

REMARKS This species is not uncommon over much of its range and apparently keeps to the forest, forest clearings, and second growth. It eats insects and small reptiles.

***Accipiter melanochlamys* (Salvadori)**

Black-mantled Goshawk. Length 12–17 in. Adults: upperparts including wings, tail and head all round greyish black to black; across the upper back a broad dark vinaceous maroon collar; throat sooty greyish black; underparts dark vinaceous maroon; wing quills below with broad greyish inner edges; tail below generally greyish to greyish black with a suggestion of narrow barring; iris deep yellow; cere and skin about eye yellow; bill black and grey; feet yellow, nails black. Male wing 221 mm, tail 152 mm, exposed culmen 15 mm, tarsus 62 mm. Female larger: wing 256 mm, tail 195 mm. Immature: upperparts dusky brownish edged and barred with bright and dark brown; flight quills above dark brown barred with blackish; sides and rear of neck and upper back largely whitish but this colour is mostly concealed by broad blackish centre striping and spotting; under wing and tail surfaces pale with much narrow dark barring.

RANGE Mountains of New Guinea; 4,800 to 9,600 ft.

SUBSPECIES Two similar ones:

a) *melanochlamys* (Salvadori); Arfak Mountains; upperparts generally black.

b) *schistacinus* (Rothschild and Hartert); mountains of central and eastern New Guinea (Weyland, Upper Mamberamo, Oranje, Giluwer, Hagen, Bismarck, Kubor, Huon, and south-eastern New Guinea); like *melanochlamys* but upperparts paler, more greyish black (valid?).

REMARKS Little is known concerning this uncommon to rare species except that it keeps within the forest and that its prey includes insects and frogs. However, Ripley records one bird hawking through *casuarina* groves and gardens, causing much concern to the weaver birds.

### *Accipiter soloensis* (Horsfield)

Chinese Goshawk. Length 10–12 in. Adults: entire upperparts dark sooty or bluish grey; feathers of hind crown and nape with white bases; wing and tail quills above dark grey to blackish often with inconspicuous blackish barring; lores often greyish; sides of head, of neck, and of upper breast usually greyish; throat usually whitish with traces of dark streaking; remaining underparts whitish to greyish to cinnamon-brown (clear to intermixed) and palest on abdomen; under wing-coverts usually whitish; inner basal halves of secondaries mostly white sometimes with narrow blackish barring; tail below grey usually with bold black bars; iris dark brown; bill black, with a plumbeous base; cere yellow; legs chrome. Male wing 170 mm, tail 120 mm, exposed culmen 12 mm, tarsus 44 mm. Female larger: wing 187 mm, tail 127 mm. Immature: brown above with much of the underlying white of the nape and hind neck showing through; wing and tail dark brown often with broad dark bars; underparts whitish with vivid broad brown central stripes and spots.

RANGE Breeds from north China and Korea south to Kwangtung and Formosa (?). Winters south to the Malay Peninsula, the Malay Archipelago and western New Guinea.

REMARKS This migrant species is rare in the New Guinea region. It has been recorded only in the Western Papuan Islands (Gagi, Waigeu, Efman).

### *Accipiter cirrhocephalus* (Vieillot)

Australian Sparrow-Hawk. Length 11–14 in. Adults: upperparts, sides of head, wings and tail dark slate-grey, the wing and tail quills with inconspicuous narrow dark barring; feathers of hind head and neck with white bases; collar on hind neck suffused with chestnut-brown, the collar joining sides of neck and underparts which are also generally chestnut-brown, usually barred with whitish; throat and under tail-coverts usually grey; wing and tail quills below usually grey with dark barring; iris golden-yellow; cere greenish; bill black with a slate base; feet lemon-yellow. Male wing 180 mm, tail 132 mm, exposed culmen 12 mm, tarsus 54 mm. Female larger: wing 202 mm, tail 142 mm. Immature: dark brown to blackish brown above tinged and edged

with chestnut especially on the hind collar; underparts whitish with vivid cinnamon-brown to dark brown striping and barring.

RANGE New Guinea, Aru Islands, and Australia; sea level to 1,700 ft.

SUBSPECIES IN NEW GUINEA Two similar ones:

a) *papuanus* (Rothschild and Hartert); Aru Islands, Western Papuan Islands (Salawati, Waigeu), islands of Geelvink Bay (Japen), and all of New Guinea; immature streaked and barred with cinnamon-brown on whitish underparts.

b) *rosselianus* (Mayr); Louisiade Archipelago (Rossel Island); like *papuanus* but immature streaked and barred with dark brown on whitish underparts.

NESTING [Nest: a slightly hollowed platform of small sticks sometimes lined with green leaves. Eggs two to four, white, with a few brown blotches; size 38 × 30 mm. Incubation about nineteen days. Young when first hatched are covered with white down. Australian data.]

REMARKS The Australian sparrow hawk is not uncommon in the lowland forests and wooded savannahs, where its food is small birds and mammals.

### *Megatriorchis doriae* (Salvadori and d'Albertis)

Doria's Hawk. Length 20–27 in. Adults: upperparts, crown and hind neck black, the feathers laterally edged with buffy or russet and with some of the concealed white basal part of the feathers showing through giving a streaked pattern; rest of upperparts boldly barred black and grey and the feathers with narrow buffy to russet terminal edgings; wing quills boldly barred with black and grey; tail with ten to twelve narrow black and an equal number of grey bars and a narrow grey tip; lores nearly bare; a broad black streak behind eye with a buffy white finely black streaked band above it; lower side of head and throat whitish finely streaked black; rest of underparts yellowish or ochraceous white with two types of streaking, either sharply defined blackish stripes or pale reddish brown stripes with fine blackish shaft streaks, this streaking most pronounced on breast; underside of wing whitish towards base, quills with six or more blackish bars alternating with grey ones distally; underside of tail grey with eight or more narrow blackish bars; iris dark brown; bill blackish; feet dull greenish yellow. Male wing 287 mm, tail 256 mm, exposed culmen 23 mm, tarsus 84 mm. Female wing 348 mm, tail 312 mm.

RANGE All New Guinea; lowlands up to 3,000 ft; presumably a forest bird.

REMARKS This is evidently one of the rare New Guinea birds. The

finely barred primaries and the long, finely barred tail should easily separate it from *Henicopernis* which it superficially resembles. In the hand, of course, the long tarsus is also diagnostic. We have no notes on its habits, but a specimen in the British Museum is marked as having killed a *Paradisaea minor*.

### *Butastur indicus* (Gmelin)

Grey-faced Buzzard. Length 15–19 in. Adults: lores and a patch each side of forehead whitish; top of head, neck, and upper back grey-brown with black shafts to feathers, and on nape the semi-concealed white bases may show through; rest of upperparts brown more or less tinged rufous, the feathers black-shafted; upper tail-coverts tipped and barred whitish; tail above with three black bars and three grey bars and a narrow grey tip; wing quills above blackish, with inner web paler, barred with black and, basally, white tinged rufous; side of head grey; throat white with a central and two lateral streaks black, the last sometimes ill defined; breast pale reddish brown or dull brown scantily spotted and barred white; abdomen white with many grey-brown or brown bars: under tail-coverts plain white; under wing-coverts white with a few rufous bars; under side of wing quills greyish white, or tinged rufous, and with a few narrow scattered black bars; under side of tail grey with outer quills plain, rest with two or three black bars; iris and feet yellow; bill yellow with black tips; cere yellow. Male wing 320 mm, tail 186 mm, exposed culmen 20 mm, tarsus 56 mm. Female similar. Immature: like adult but side of head and upperparts generally dark brown, breast and abdomen white streaked with black or brown, heaviest on breast.

RANGE Breeds in eastern Asia and Japan. Migrates in winter to south-eastern Asia, Philippines, Malaysia (Celebes, Moluccas) and the Western Papuan Islands, where found on Salawati, Waigeu, and islets near Sorong.

### *Harpyopsis novæguineae* (Salvadori)

New Guinea Eagle. Length 30–35 in., wing span 62 in. Adults: upperparts including crown greyish brown to dark brown with variable degrees of grey edging and obscure grey barring or mottling; short occipital crest like crown; wing quills above pale brown with dark brown bars; tail quills grey-brown with three or four narrow and a wider subterminal black bar; sometimes a partial blackish eye-ring; sides of head and neck, also sometimes upper breast and flanks, brownish grey; rest of underparts whitish tinged (or stained?) irregularly with brown; wings below more greyish and with widely spaced bold dark bars near the tip; tail below grey with three narrow

and a broader subterminal black bar; iris light brown; skin about eye grey; bill brownish black with the tip and mandible bluish white; feet yellow; nails black. Male wing 420 mm, tail 364 mm, exposed culmen 43 mm, tarsus 123 mm. Female larger: wing 494 mm, tail 410 mm, exposed culmen 46 mm, tarsus 144 mm. Immature: like adult but underparts barred.

RANGE All of New Guinea; sea level to 9,000 ft.

NESTING Shaw-Meyer collected a young bird from a large stick nest sixty feet up a tree in mountain forest; a nest which natives told him had been in use the year before.

REMARKS The New Guinea eagle lives throughout the lowland and mountain forests and forest edges. It is usually seen soaring back and forth in wide circles over the sides of steep forested slopes or ridges, or perched near a tree trunk on a horizontal branch in the shaded subcanopy of the forest. The food of this species is wallabies and other marsupials which it apparently catches on the floor of the forest. The flight quills of this large eagle are highly prized as articles of native adornment.

***Spizaetus gurneyi* (G. R. Gray)**

Gurney's Eagle. Length 29–34 in. Adults: generally dark brown to blackish brown, averaging darker on head and mantle; much of undersurfaces of primaries and secondaries, also basal halves of rectrices below dark greyish; shanks (feathered to toes) mostly dark buffy greyish; iris dark yellow; bill slate with a black tip; feet dull yellow; nails black. Male wing 520 mm, tail 316 mm, exposed culmen 34 mm, tarsus 105 mm. Female wing 550 mm, tail 345 mm, exposed culmen 43 mm, tarsus 110 mm. Immature: upperparts irregularly coloured with grey, canvas-brown, and dark brown; feathering of head suffused with cinnamon-brown and edged with buff; secondaries and rectrices blackish brown with greyish barring and spotting; underparts generally buff suffused with ochraceous brown, sometimes becoming dark brown on upper breast; shanks white.

RANGE Northern Moluccas (Morotai, Halmahera, Ternata, Batjan), Aru Islands, Misol Island, Western Papuan Islands (Waigeu, Salawati?), islands of Geelvink Bay (Japen), western and central New Guinea (Sorong, Huon Gulf, Gaima), D'Entrecasteaux Islands (Goodenough).

REMARKS Gurney's eagle is apparently a little known species of the lowland forests and sea shores. It seems to favour small oceanic islands.

The only three individuals we have seen were in forest and swamp country on the lower Fly River in 1936. They were perched on the tops of tall trees and were not at all wary. The species was not seen soaring; in striking contrast to the behaviour of the similar-sized, blackish, wedge-tailed eagle. The two can be confused. But *U. audax* has some rufous in its plumage: much rufous and black in immature, mostly black but with at least rufous lanceolate nape patch and rufous under tail-coverts in adult, while *S. gurneyi* in adult plumage is generally dark brown to black without rufous, and the immature with its pale underparts is quite different. *U. audax* also has a wedge-shaped tail tip, with outer quills about four inches shorter than central ones which taper to a point, while *A. gurneyi* has a rounded tail tip with outer quills about two inches shorter than central ones which are broad and rounded only at the tip.

***Uroeatus audax* (Latham)**

Wedge-tailed Eagle. Length 30–39 in., wing span 75–87 in.; legs feathered to toes; tail wedge-shaped. Adults: generally blackish; upper wing-coverts often paler and with some rufous; flight quills black; a wide ruff of pointed feathers on sides and back of neck usually rufous brown with narrow black streaks and some rufous in breast; the only blackish eagle in New Guinea with a wedge-shaped tail; basal undersurfaces of wing quills usually partly greyish or whitish without bars; under tail-coverts usually rufous or greyish brown; iris brown; bill yellowish to bluish white with a black tip; feet yellowish white; nails black. Male wing 570 mm, tail 350 mm, exposed culmen 37 mm, tarsus 104 mm. Female somewhat larger: wing 575 mm, tail 370 mm. Immature: generally a patchwork of rufous brown, canvas-brown and dark brown, with the upper wing-coverts and upper tail-coverts palest; tail dark barred and spotted indistinctly with grey.

RANGE Southern New Guinea, Australia, and Tasmania.

NESTING [Nest: a huge stick platform in a tall tree fork or on a rock ledge on a treeless sea island. Eggs one or two, whitish, spotted and splotched with browns; size 67 × 56 mm. Nestling with cottony white down. Australian data.]

REMARKS In south New Guinea near the Oriomo River this magnificent eagle was not uncommon in February 1934, when as many as five or six individuals, distinguishable by their different plumages, were seen almost daily. Sometimes one or two birds perched for hours in the top of a tall tree; at other times the birds soared and sailed high in the air. At all times they were extremely wary. This was in open savannah country where wallabies were very common. Their carcasses formed



1 *Ptilinopus pulchellus*, Beautiful Fruit Dove (bottom); *Pseudeos fuscata*, Dusk-orange Lory (centre right); *Charmosyna papou*, Fairy Lory (centre left); *Tanysiptera galatea*, Common Paradise Kingfisher (top right).

the main food of the whistling kite, and perhaps they also furnished the main diet of these birds which, in Australia, are known to feed on small mammals and carrion. In 1936, when we spent most of a year on the Fly River, partly in savannah country, and in the Wassi Kussa River savannah country to the west, none was seen, and possibly this could be correlated with the fact that wallabies were not nearly so common as in 1934 in the Oriomo River country. For comparisons with *Spizaetus gurneyi* see under that species.

***Hieraaetus morphnoides* (Gould)**

Little Eagle. Length 15–19 in. Adults: upperparts including crown and nape dark brown to blackish brown, the feathers with white basal halves some of which may show through, especially in nape; underparts including throat whitish or buffy with moderate to heavy brown streaking particularly on upper breast; shanks buffy whitish and feathered to toes; this is the only 'hawk' in New Guinea with a feathered tarsus; wings and tail above dark with blackish bars; iris amber-brown; bill medium grey with a dark tip; cere, gape and skin around eye grey; feet greenish white; nails black. Male wing 307 mm, tail 177 mm, exposed culmen 21 mm, tarsus 56 mm. Female larger: wing 338 mm, tail 195 mm. Immature: upperparts generally more greyish particularly on head, neck, and wing-coverts; underparts strongly suffused with ochraceous brown.

RANGE New Guinea and Australia.

SUBSPECIES IN NEW GUINEA One, *weiskei* (Reichenow); central and eastern New Guinea (Utakwa River region, Snow Mountains, Adelbert Mountains, Huon Peninsula, Astrolabe Mountains, and Aroa River region); lowlands to 5,200 ft.

NESTING [Nest: an old hawk or crow nest freshly lined with green leaves. Eggs one or two, white to bluish white, often smudged or streaked with brown; size 56 × 46 mm. Nestling with creamy white down. Australian data.]

REMARKS The little eagle is apparently rare. The two examples we have seen were perched in trees on the edge of second growth forest and garden land in the mid-mountains.

***Haliaeetus leucogaster* (Gmelin)**

White-bellied Sea Eagle. Length 27–31 in. Adults: entire head, neck and underparts including lesser under wing-coverts and terminal third of tail white, the body feathering with narrow black shaft streaks; back, wings and basal two-thirds of tail dark ash-grey to blackish on wing quills; iris greyish brown, sometimes pink; bill greyish brown with a

blue-grey base; cere blue-grey; skin of face slate; feet dull whitish; talons black. Male wing 495 mm, tail 240 mm, exposed culmen 40 mm, tarsus 94 mm. Female larger: wing 580–90 mm, tail 262 mm. Immature: generally canvas-brown to dark brown with a paler brown head and neck.

RANGE Sea coasts and large lowland rivers from India and Ceylon eastward through the Malay Archipelago to Tasmania, Australia, the New Guinea region and the Bismarck Archipelago. In the New Guinea region known from the Aru Islands, the Western Papuan Islands (Schildpad, Waigeu), Seleo Island off the Aitape coast, all of New Guinea, and Woodlark Island.

NESTING [Nest: a wide deep platform of sticks in a tree or on a rocky crag always near water, lined sparsely with green leaves. Eggs two, white; size 71 × 53 mm. Australian data.]

REMARKS The sea coast and the larger inland waterways as far as the middle Fly, Sepik and Idenburg Rivers, are the habitat of this fish-eating eagle, though it is sometimes found soaring over the savannah miles from a river, and also over the open sea. The birds are usually seen singly or in pairs, perched on tall trees, or flying or soaring over the water or shore. Though fish may be its usual diet (two records) a single bird was seen carrying a large sea snake, and the natives of the middle Sepik River say that this species feeds on snakes, small crocodiles, and river-borne carrion. On the Fly River an eagle was seen to follow and strike at a whistling kite (*Haliastur sphenurus*), causing it to drop the food it was carrying, which the eagle seized before it reached the water.

### Key to *Circus* Species

Underparts mostly warm dark brown: *C. approximans.*
Underparts pale grey or white, striped with brown or black: *C. spilonotus.*

### *Circus spilonotus* (Kaup)

Spotted Marsh Harrier. Length 19–21 in. Adult male: a harrier with black and silvery grey upperparts and white rump; underparts white, streaked on breast. In more detail: forehead white; top and sides of head and of neck black with white of edges of feathers on nape showing through; back and scapulars black, the latter with white tips; lesser wing-coverts mostly black, others silvery with subterminal black blotches; secondaries and inner primaries silvery grey with dark subterminal areas; outer primaries black with inner webs basally marbled with white; upper tail-coverts white, tail mostly silvery grey; underparts, throat and breast white boldly streaked black; rest of underparts plain white; undersurface of wing quills silvery grey, white and black;

undersurface of tail greyish white; iris pale yellow; bill black, grey at base of mandible; cere greenish; feet light yellow; nails black. Male wing 370 mm, tail 224 mm, exposed culmen 20 mm, tarsus 85 mm. Female larger: wing 403 mm, tail 235 mm.; with black markings replaced with brown; dark areas of crown, nape and sides of head usually less extensive and generally more greyish; wing quills dark brown with grey bars; tail generally buffy barred with dark brown. In another phase: generally solid chocolate-brown with pale striped areas on head, throat, upper breast and upper wing-coverts.

RANGE Widespread in Asia from Turkestan to China, also south to the Philippines, Indo-China, New Guinea, Reunion Island, Madagascar and Comoro Island.

SUBSPECIES IN NEW GUINEA One, *spilothorax* (Salvadori and D'Albertis); central and eastern New Guinea west to Astrolabe Bay, Snow Mountains and Fly River area; sea level to 11,500 ft.

NESTING [On the ground in swampy grass country; eggs three to five, whitish; size 48 × 38 mm. Asiatic data.]

REMARKS This harrier is wary and hard to approach, but generally not uncommon over open grasslands and marshes, especially in the mid-mountain and alpine grassland regions. The spotted marsh hawk hunts its prey by beating back and forth five to fifty feet up, sometimes hovering, sometimes dropping out of sight into tall marsh reeds. Its recorded food in New Guinea is lizards and small birds.

***Circus approximans* (Peale)**

Swamp Harrier. Length 18–23 in. Adults: upperparts generally dark brown, the feathers on hind neck with some white and buff bases and edges showing; upper tail-coverts usually white or buff spotted with brown; flight quills dark brown to grey and buff, often with indistinct or narrow dark bars; underparts often nearly solid dark brown washed with rufous or buff and with bold brown stripes; wing quills below white with narrow blackish bars, or inner basal edges of wing quills buffy; under tail surfaces greyish or ochraceous grey with some dark bars; iris brown; bill black to blue-grey; cere olive-grey; feet lemon-yellow. Male wing 385 mm, tail 223 mm, exposed culmen 22 mm, tarsus 87 mm. Female larger: wing 418 mm, tail 250 mm, and slightly darker.

RANGE Fiji Islands, New Caledonia, New Hebrides(?), southern New Guinea, Australia, Tasmania, New Zealand; near sea level.

SUBSPECIES IN NEW GUINEA One, *gouldi* (Bonaparte); south and south-eastern New Guinea.

NESTING [Nest: a ground platform of reeds surrounded by, or in, water; used year after year. Eggs three to six, white or bluish white; size 53 × 40 mm. Nestling with white down. Australian data.]

REMARKS The swamp harrier is an uncommon species seen flying alone or in pairs over wooded savannahs, open marshes and grassy river flats. One bird near Lae was hunting over rolling bushy fields bordered on one side by a road and on the other by forested hills. In its hunting, the harrier glided and wheeled a few yards above the ground, often going between small trees. When it sighted prey, the bird flipped its body sideways and dropped into the grass where it sometimes stayed a few minutes, apparently devouring its catch on the ground. Sometimes the harrier kept remarkably close to a truck passing along the road as though watching for prey flushed by its movement.

## Family Pandionidae *Osprey* or *Fish Hawk*

*(A single species)*
This family consists of a single species, and it has one of the widest ranges of any bird, occurring on every continent.

### *Pandion haliaetus* (Linnaeus)

Osprey. Length 18–21 in. Adults: upperparts brown; head and neck all round and underparts white with a bold brown streak behind eye, a broad brown band across the upper breast and hind neck usually with a dark spot; wings and tail pale brown with some pale grey spotting or bars; iris pale yellow to cream; bill black; cere blue; feet bluish white. Male wing 410 mm, tail 170 mm, exposed culmen 31 mm, tarsus 58 mm. Female larger: wing 450 mm, tail 193 mm.

RANGE Nearly world-wide chiefly along sea coasts, less often along large lowland rivers and lakes.

SUBSPECIES IN NEW GUINEA One, *melvillensis* (Matthews); found on sea coasts and lowland rivers of New Guinea, westward through the Malay Archipelago to Java and Malaya, northward to Palau, Bismarck Archipelago, and eastward and southward to Solomon Islands, New Caledonia, Australia and Tasmania.

NESTING [Nest: on rocks near water; a mass of sticks and seaweed. Eggs two to four, short oval, white blotched with browns; size 65 × 46 mm. Australian data.]

REMARKS The osprey is uncommon along the coasts of New Guinea where it is usually found alone, feeding in both fresh and salt water, and birds have been seen more than 100 river miles inland on the Idenburg

River. The birds sit on conspicuous perches and fly over the open water seeking their prey which consists almost entirely of fish and water snakes. They plunge feet first into the water to capture these in their talons.

## Family Falconidae *Falcons*

*(Fifty-eight species, five in New Guinea)*

The falcons number some fifty-eight species, some of which occur on all the large land masses of the world; five species occur in New Guinea, where four of them probably nest. Some, such as the peregrine falcon, are fast flying, bird-eating falcons, while the brown falcon is more slow moving and specializes in lizards, and the kestrel is a lighter, more delicate bird which probably eats many insects.

### Key to *Falco* Species

1 More than 15 in. long: 2.
Less than 14 in. long: 3.

2 Crown black; back black and grey; feeds on birds captured in flight: *F. peregrinus*.
Crown and back brown; feeds on insects and small reptiles: *F. berigora*.

3 Back dark grey or blackish: 4.
Back reddish brown: *F. cenchroides*.

4 Crown and nape blackish: *F. severus*.
Crown and nape greyish: *F. longipennis*.

### *Falco peregrinus* (Tunstall)

Peregrine Falcon. Length 13½–20 in. Adults: entire upperparts grey to black, becoming pale grey or barred with ashy grey on lower mantle; wing quills brownish grey to black indistinctly spotted or barred with grey on inner web; tail quills black boldly barred and tipped with grey; top and side of head solidly black or dark grey (subspecies); throat, sides of neck and upper breast whitish; remaining underparts (including under wing-coverts) grey (sometimes tinged with buff or ochraceous) and profusely barred with black; iris black; bill grey with tip black; cere, gape and skin around eye yellow; feet pale yellow. Male wing 281 mm, tail 132 mm, exposed culmen 20 mm, tarsus 47 mm. Female larger: wing 345 mm, tail 163 mm. Immature: upperparts dark brown to blackish brown, top and side of head solidly black; underparts whitish or buffy heavily streaked and barred with dark brownish except on throat.

RANGE Nearly world-wide; in New Guinea lowlands to 7,300 ft.

SUBSPECIES IN NEW GUINEA Two distinct ones:

a) *ernesti* (Sharpe); Aru Islands, islands of Geelvink Bay (Japen), all of New Guinea, Woodlark Island, Bismarck Archipelago; head and upper back solid black.

b) *subspecies*(?); winter migrant from Asia(?); like *ernesti* but head and upper back dark grey.

NESTING [Nest: a hollow in a tree or on a cliff ledge. Eggs two to three, short oval, buffy white heavily blotched with reddish brown; size 51 × 41 mm. Australian data.]

REMARKS The peregrine falcon is uncommon and found chiefly in areas with cliffs such as the Hombron cliffs near Rona Falls and the cliffs of interior mountains such as Mt Giluwer. However, it is also found over grasslands and in the forest edge where the species sometimes perches for extended periods on dead branches. In the Adelbert Mountain forests one was seen in a dead tree sixty feet up over a forest garden. This bird, which had a large green bird (parrot or pigeon) in its talons, was attacked by a little oriental hobby (*Falco severus*). The hobby, upon seeing the peregrine, approached it from the back by diving steeply and sweeping by very close; as it did so the peregrine opened its wings and emitted a loud noise which sounded like the creaking of an old gate.

### *Falco severus* (Horsfield)

Oriental Hobby. Length 10–12 in. Adults: upperparts including sides of head and throat, wings and tail sooty grey to black; underparts rich rufous with a variable amount of narrow black striping except for throat to upper breast which is buff to pale ochraceous; iris dark brown; bill dark grey with an olive base; cere and gape greenish yellow; feet orange-yellow. Male wing 214 mm, tail 100 mm, exposed culmen 14 mm, tarsus 31 mm. Female larger: wing 240 mm, tail 109 mm. Immature: dark rufous underparts heavily spotted or blotched with black.

RANGE India eastward through China, south-eastern Asia, Philippines, islands of the Malay Archipelago, New Guinea, Bismarck Archipelago, Solomon Islands; in New Guinea from lowlands up to 3,000 ft.

SUBSPECIES IN NEW GUINEA One, *papuanus* (Meyer and Wiglesworth); Celebes, Moluccas, Western Papuan Islands (Salawati), islands of Geelvink Bay (Japen), all New Guinea, New Britain and Solomon Islands.

NESTING [Nest: a cleft in a tree or a discarded nest, or rarely on a cliff ledge. Eggs two to three, variably buffy to reddish brown more or less heavily spotted with dark brown; size 40 × 32 mm. Asian data.]

REMARKS This little falcon is uncommon and lives in or on the edge of the forest. Some we have seen perched for long periods on high, exposed dead branches, apparently watching nearby small birds. The food of this species as recorded elsewhere is said to be insects, birds, and bats; the last caught in flight at dusk.



***Falco longipennis* (Swainson)**

Australian Hobby or Little Falcon. Length 12–15 in. Adults: upperparts generally sooty grey to dark ash-grey with some inconspicuous black shafting; forehead and lores whitish; sides of head and especially a large spot extending from below eye to side of throat blackish; flight quills grey to sooty grey with much prominent grey to bright rufous barring and spotting; throat to upper breast whitish to pale ochraceous; remaining underparts buffy to dark tawny brown with some thin dark shaft streaks; iris dark brown; bill greyish with a black tip; cere greenish yellow; legs yellow. Male wing 242 mm, tail 128 mm, exposed culmen 15 mm, tarsus 38 mm. Female larger: wing 271 mm, tail 137 mm. Immature: like adults but darker more brownish grey above and upper breast and flanks with much blackish barring and streaking.



RANGE Australia, Tasmania; in winter as a migrant to south New Guinea (Merauke to Fly River area); New Britain, Moluccas and Lesser Sunda Islands.

SUBSPECIES IN NEW GUINEA One, *longipennis* (Swainson).

NESTING [Nest: made of twigs and sticks, lined with leaves or bark, high in a tree; sometimes in an old nest built by another bird. Eggs two to three, sometimes four, buff, spotted and blotched with brown; size 46 × 34 mm. Australian data.]

REMARKS This long-winged falcon has been recorded only a few times and then only in the lowlands of south New Guinea. Apparently, most, if not all, the New Guinea records are of females. In the lower Fly River area, three were seen (during March, June, and August) over open savannah or open marsh, and one was found to have eaten five bats, another many large winged ants.

***Falco chenchroides* (Vigors and Horsfield)**

Australian Kestrel. Length 12–14 in. Adults: back including shoulders and wing-coverts bright chestnut-brown with some small black central streaking; top and sides of head and neck dark grey (sometimes tinged with rufous) with fine black central streaks; forehead and lores whitish; wing quills blackish with some white barring on inner vanes; upper tail-coverts and tail dark ash-grey, the tail with a broad black subterminal band; throat, under wing-coverts and under tail-coverts

whitish; remaining underparts rufous to pale clay-colour with variable degrees of narrow dark striping; iris brown; bill bluish grey, black at tip; cere dark orange-yellow; feet yellow; nails black. Male wing 257 mm, tail 167 mm, exposed culmen 14 mm, tarsus 40 mm. Female larger: wing 267 mm, tail 176 mm. Immature: like adults but broadly barred and streaked above and streaked below, and with the tail extensively barred with black.

RANGE Tasmania, Australia, Aru Islands (one record), and Snow Mountains at 10,000–11,000 ft in New Guinea.

SUBSPECIES IN NEW GUINEA Two:

a) *baru* (Rand), known only from the vicinity of Mt Wilhelmina, Oranje Mountains.
b) *chenchroides* (Vigors and Horsfield); Aru Islands; like *baru* but head rufous or paler grey and with upperparts and underparts paler.

NESTING [Nest: a rock crevice or tree niche. Eggs five, white blotched with browns; size 36 × 29 mm. Australian data.] In New Guinea the only record is of a nest containing one well-grown nestling on a rocky ledge.

REMARKS The kestrel of the Snow Mountains was an uncommon bird usually seen flying over the alpine grassland or resting on some conspicuous perch there, especially in the vicinity of cliffs. Two birds were found to have eaten lizards and another only insects.

### *Falco berigora* (Vigors and Horsfield)

also known as *Ieracidea berigora*

Brown Hawk or Brown Falcon. Length 16–21 in. Adults, light phase: upperparts including head and wing-coverts greyish brown to reddish brown with narrow black shaft streaks; wing quills dark brown to blackish with prominent ochraceous to buff bars and spots on inner webs; tail feathers dark brown with narrow ochraceous bars; sides of head including ear-coverts and a prominent facial streak largely blackish; a whitish cheek spot; underparts including some under wing-coverts whitish or pale clay-brown to rufous with narrow dark central streaking; inner edges of flight quills pale with dark bars. Adults, dark phase: like preceding but light areas (except usually throat, abdomen and flight quills) dark sooty brown. Iris greyish brown to blackish brown; bill horn-colour; cere whitish; naked skin around eye blue-grey; legs pale grey. Male wing 324 mm, tail 184 mm, exposed culmen 19 mm, tarsus 70 mm. Female larger: wing 370 mm, tail 233 mm. Immature birds have rufous edgings to many feathers of the upperparts.

RANGE Tasmania, Australia and central and eastern New Guinea; from lowlands to 9,000 ft.

SUBSPECIES IN NEW GUINEA One, *novaeguineae* (Meyer); coastal islands of north-eastern New Guinea (Karkar, Manam) and the eastern two-thirds of New Guinea (west in the south to the Merauke district and in the north to the Weyland Mountains).

NESTING [Nest: an old nest of another bird or a tree hollow. Eggs two to three, buffy white blotched with reddish brown; size 49 × 40 mm. Australian data.]

REMARKS This species has a haphazard distribution: it is the commonest hawk in south-eastern New Guinea, indeed the only hawk seen regularly in the mountains; it is only fairly common in the Wahgi and Balim River valleys, and in the Telefomin region and along the Sepik and Fly Rivers it is rare. It is a bird of the open country and forest edge: savannahs, clearings, mid-mountain grasslands, and locally in the lower edge of the alpine grassland. The birds are conspicuous but wary and usually seen flying over the grass country or brushy land or perched in some commanding situation, often giving a loud, whistled cry. The species' main food seems to be the small lizards that run about the clearings and trails, and insects. Of twelve stomachs examined, seven contained lizards, three small snakes, six large insects, and one a rodent. Others have recorded centipedes and young birds as part of the food.

# Order 8 Galliformes

## Fowl-like birds

*Seven families, two in New Guinea*



This order includes such well known birds as domestic fowls, peafowls, guinea hens, pheasants, quail and partridge. Two families are represented in New Guinea:

1 MEGAPODIIDAE Seven species in New Guinea. Gallinaceous birds of large size, 12–24 in. long, usually of dull, little-patterned plumage; feet relatively large; all forest birds.

2 PHASIANIDAE Three species in New Guinea. Small to medium sized gallinaceous birds, $4\frac{1}{2}$–11 in. long, some with bright or barred patterns; feet relatively small; all birds of the grasslands.



### Family Megapodiidae *Megapodes* or *Brush Turkeys*

*(Eighteen species, seven in New Guinea)*

This is a family of eighteen species with its headquarters in the New Guinea–Australia region, but with representatives north to the Nicobars, the Philippines, Melanesia, and east to the Solomon Islands and New Hebrides. Seven species live in the New Guinea area.

These fowl-like birds with sexes alike and with heavy feet are notable for burying their eggs in mounds they scratch together, or in sand. Incubation is by the heat generated from decaying vegetation in the mounds, solar heat on the sand, or from volcanic heat. In some species the adults, sometimes at least, regulate the heat in the mounds by opening them or adding more covering. The incubation period may extend to sixty-three days or longer. The young hatch down-covered and with wing quills large enough to enable them to fly. These chicks are the most precocious of birds, going their solitary way from hatching, uncared for by their parents.



The New Guinea species are all forest birds. The adults are often found in pairs, walking about on the forest floor where they feed on

fallen fruits, insects and snails. Sometimes the birds are noisy, especially early in the morning and in the evening, and occasionally at night.

While these birds are locally common, judging by their loud calls, the amount of scratching on the ground, and the presence of mounds, they are shy and hard to see. The field observations made in New Guinea are very scanty.

### Key to *Megapodiidae* Species

1 Crown not completely covered with feathers and with conspicuous wattle in adult male; upperparts black with red-brown upper tail-coverts: *Aepypodius,* 2.
Crown completely feathered, no trace of wattles; upperparts various but not as above: 3.

2 Underparts black: *A. arfakianus.*
Underparts red-brown and grey: *A. bruijnii.*

3 Size large, length 20 in. or more; tail relatively long, 6 in. or more and plumage generally black: *Talegallus,* 4.
Size smaller, length 15 in. or less; tail relatively short, 3 in. or less; plumage various: 6.

4 With a dark red-brown collar, often obscure; feathers of crown somewhat elongated in a broad crest: *T. jobiensis.*
Without a red-brown collar; feathers of crown somewhat decomposed and not lengthened into a crest: 5.

5 Bill orange-red: *T. cuvieri.*
Bill blackish: *T. fuscirostris.*

6 Mantle coarsely barred with brown, grey, and olive: *Eulipoa wallacei.*
Mantle not barred: *Megapodius freycinet.*

### *Megapodius freycinet* (Gaimard)

Common Scrub Hen. Length 11–15 in. Adults: upperparts either (a) dark amber-brown with a broad, dark, grey collar and dark maroon-brown rump, or (b) (in two races) nearly solid sooty blackish; head and neck thinly feathered, with a short crest and with reddish pink skin showing through; underparts either (a) dark greyish brown more brownish posteriorly and often with some dark reddish brown on sides, abdomen and under tail-coverts, or (b) (in two races) solid blackish; iris hazel; bill dark brown, yellowish at tip; gape salmon; feet bright salmon, duskier on distal half and on tops of toes. Wing 195–235 mm, tail 66–83 mm, culmen 15–20 mm, tarsus 63–68 mm.

RANGE Philippine Islands, Sulu Islands, Malaysia, northern Moluccas, New Guinea and its satellite islands, northern Australia, Bismarck Archipelago, Solomon Islands, Melanesia, and New Hebrides; near sea level, occasionally up to 5,500 ft.

SUBSPECIES IN NEW GUINEA Six rather well marked races:

a) *aruensis* (Mayr); Aru Islands; back dark amber-brown; sides, thighs and rump dark maroon-brown; wing 235 mm.

b) *duperryii* (Lesson and Garnot); west and south New Guinea (eastward in the north to the Wandammen district, eastward in the south to extreme eastern New Guinea, then west on the north watershed to the Kumusi River); like *aruensis* but paler.

c) *macgillivrayi* (Gray); D'Entrecasteaux Archipelago, Trobriand Islands, Bonvouloir Islands, Woodlark Islands, and Louisiade Archipelago (Misima, Tagula, Duchateau, Pig and Rossel Islands); like *aruensis* but smaller (wing 228 mm) and back much darker, also underparts solid blackish grey.

d) *affinis* (Meyer); north New Guinea from head of Geelvink Bay eastward to Mambare River (also extending to south watershed of Nassau Mountains), also off-shore islands (Japen, Manam, Tarawai, etc., but on Karkar, a mixed population of *affinis* and *eremita* of the Bismarck Archipelago); like *aruensis* but smaller (wing 218 mm) and with paler, more olive upperparts.

e) *geelvinkianus* (Meyer); islands of Geelvink Bay (Biak, Numfor, Manim, Meos Num, Meos Korwar, and perhaps islands off coast of Japen); like *aruensis* but generally blackish and much smaller (wing 195 mm).

f) *freycinet* (Gaimard); northern Moluccas, Western Papuan Islands (Waigeu, Batanta, Gebe, Gagi, Boni, Salawati, Misol, Kofiau) and small islands off west New Guinea (Sorong, Pulu Hum); like *geelvinkianus* but larger (wing 223 mm).

NESTING The adults rake together relatively huge piles of fallen vegetation and soil. Heat generated by the decomposition of this vegetation is utilized for the incubation of the eggs. The mounds are up to six feet in height, with flattened tops (some are at least fifteen feet in diameter) and very broad bases (some reach at least thirty feet). Mounds are used for years and one mound was said to be thirteen years old: natives say there may be two to four pairs of birds at a mound, eggs may be found at any season and that twenty-eight were taken one year from a single mound. The eggs are deposited large-end-upwards in holes excavated one to three feet deep in the top of the mound. Incubation requires about sixty-three days. The chicks hatch and dig their way up out of the nest mound. They are then capable of flight and receive no care from the parents. Eggs six to eight, long oval, dull buff (when fresh) to coffee brown (after a few days in the mound); size 48 × 83 mm.

REMARKS Fairly common throughout the lowlands near water. Nest mounds are frequently found in low open vegetation within 150 ft of the sea coast, or in the tropical rain or swamp forest bordering tropical

rivers as far as 100 miles inland. The eggs are prized as food and in some areas the mounds are owned and protected by the Papuans. Birds startled in the forest sometimes fly up to perch on branches and some at least perch in trees to sleep.

***Eulipoa wallacei* (Gray)**

Moluccas Scrub Hen. Length 12 in. Adults: forehead buffy grey shading into dark brown top of head and short crest; hind neck olive tinged grey; back coarsely barred with olive, dark rufous brown and grey; rump and upper tail-coverts dark grey; tail fuscous; lesser wing-coverts olive; median wing-coverts grey basally with a dark rufous brown subterminal area and with grey tips; greater wing-coverts dark rufous brown on exposed areas; secondaries olive on outer webs and with rufous brown streaks on innermost secondaries; primaries fuscous with some yellow-buff edges and spots; side of head grey-brown, throat paler; rest of underparts dark grey except for white area on abdomen. Wing 200 mm, tail 65 mm, culmen 22 mm, tarsus 50 mm.

RANGE Moluccas Islands and Misol Island of the Western Papuan Islands; on most islands its altitudinal range is from 2,400 to 6,400 ft, except at nesting time when it descends to sea beaches, but on Misol it was found near sea level.

NESTING At the time of egg laying these birds are said to descend from their mountain haunts and lay their eggs in slanting burrows dug in the sand of sea beaches. The trip to the laying area is apparently made just before egg laying. It has been suggested that this species may also occasionally lay an egg in the humus mound of a *Megapodius*, in the forest.

REMARKS The presence of this Moluccan scrub hen in the New Guinea area was discovered by S. D. Ripley and reported only in 1960. It can perhaps be included in the genus *Megapodius*.

***Talegalla cuvieri* (Lesson)**

Red-billed Brush Turkey. Length 21–23 in. Adults (distinguishable from all other species of genus by orange-red rather than blackish bill; distinguishable from *fuscirostris* also by having tibia almost completely feathered, not naked for a distance of about 15 mm above tibio-tarsal joint): generally blackish; sides of head, throat and sides of neck nearly naked (with yellowish olive skin) with short greyish brown feathering; iris dull yellow; bill orange-red; feet pale orange. Male wing 285–300 mm, tail 170 mm, culmen 35 mm, tarsus 93 mm. Downy young: upperparts dark brown with a chestnut-brown collar; sides of head cinnamon; throat buffy, underparts cinnamon; wing quills blackish with bold chestnut-buff markings.

RANGE Misol, Salawati, north-west New Guinea, east in the north to Geelvink Bay (Warbusi), and east in the south to the Mimika and Utakwa Rivers. Found in the lowlands and occasionally up to 2,500 ft.

REMARKS Quite common in the lowland forests locally, but apparently very wary and hard to watch or collect. 'The call, which is usually heard in the very early morning, seldom during the rest of the day, is a loud "kok, kok", and the alarm-note is a grunt', according to Claude Grant, while Ripley records its call as a very loud call of two notes 'wok wok', very penetrating and with the nasal quality of a donkey's bray.

### *Talegalla fuscirostris* (Salvadori)

Black-billed Brush Turkey. Length 20–21 in. Adults: generally black; tibia naked for distal 15 mm; iris coffee-brown to reddish brown; bill black to blackish brown; skin of head and neck dark grey to bluish black; feet chrome to lemon-yellow. Male wing 256–90 mm, tail 165 mm, culmen 29 mm, tarsus 89 mm. Chick solid dark brown, paler, more buffy on throat and central abdomen; flight quills solid blackish brown.

RANGE Aru Islands and southern New Guinea from Etna Bay area east to Port Moresby region.

SUBSPECIES Two closely similar ones:

a) *occidentis* (White); male wing 259–72 mm; Aru Islands and southern New Guinea (from Etna Bay region eastward to Fly River).
b) *fuscirostris* (Salvadori); like *occidentis* but slightly larger; male wing 280–92 mm; coast of south-eastern New Guinea (from Yule Island region to Port Moresby region).

NESTING The nest mound is a broad, low heap of forest floor debris about three and a half feet high with a flattish top some eight feet across and a base some twelve feet across. The mounds of this species differ from those of *Megapodius freycinet* by being relatively broader in proportion to height. Eggs, nearly oval, slightly rough, pale or dark buffy brown; size 95 × 62 mm (another set 87 × 55 mm).

REMARKS This megapode is common in the solidly forested lowlands below an altitude of about 300 ft. In a few areas it is replaced by *Megapodius freycinet* for the two species seem not to live in the same areas.

### *Talegalla jobiensis* (Meyer)

Brown-collared Brush Turkey. Length 21–24 in. Adults: generally black with feathers of crown somewhat elongated forming a broad crest, short mouse-grey feathers on sides of face, throat and sides of upper neck; an indistinct dark maroon-brown collar encircling neck in which this

species is unique; tibia completely feathered; iris brown to brownish red; bill brownish horn with a dusky culmen to dark reddish brown; naked parts of face deep sooty red; naked parts of neck dark rose; legs and feet salmon to bright red. Male wing 275–307 mm, tail 185–200 mm, culmen 25 mm, tarsus 82 mm. Weight of male: up to 3 lb. 8 oz.

RANGE Probably the northern lowlands of New Guinea from Japen Island and Geelvink Bay to Milne Bay, thence west along the south coast to the Aroa River region; lowlands up to 2,700 ft.

SUBSPECIES Two very similar ones:

a) *longicauda* (Meyer); male wing 281–302 mm; south-eastern New Guinea westward in the south to the Aroa River and westward in the north to the middle Sepik River.

b) *jobiensis* (Meyer); like *longicauda* but slightly smaller, male wing 261–285 mm; Japen Island and northern New Guinea from the Mamberamo River valley to Humboldt Bay.

NESTING A broad flat mound between tall rain forest trees, used for three to five years. Each mound is the property of a single pair of birds which visit it and give it some care every morning throughout the year (native information). Eggs vinaceous russet to brown; size 95 × 60 mm.

REMARKS Fairly common in forests usually unoccupied by other megapodes; for example, on the northern watershed of the Sepik River, 190 river-miles from its mouth, the scrub hen (*Megapodius freycinet*) was common in the riverine and swamp forests bordering the river while the brown-collared brush turkey was found only in rolling forests far back from the edge of the river. This megapode, along with the common scrub hen, is important to the natives for its yield of eggs. Mounds are owned by certain natives and the eggs systematically gathered. One mound was said to have yielded about sixteen eggs in one year.

### *Aepypodius arfakianus* (Salvadori)

Wattled Brush Turkey. Length 15–18 in. Adult male: generally blackish with dark maroon rump and upper tail-coverts; head, throat and neck largely naked with short pale greyish feathering; crown with a fleshy red chicken-like comb; central lower neck with one long pendant reddish wattle; iris dark brown; bill blackish brown to greyish olive with a dark tip; feet olive-brown; skin of head various shades of blue, bluish white and pale greenish blue; wing 260–8 mm, tail 131 mm, culmen 30 mm, tarsus 90 mm. Female slightly smaller and wattles much smaller.

RANGE High mountains throughout much of New Guinea (Arfak, Cyclops, Sepik, Saruwaged in the north; Nassau and Snow Mountains

at west end of main ranges, and Owen Stanley Mountains at east end of main ranges); from 3,200 to 7,700 ft; also on Misol Island.

SUBSPECIES Two similar ones:
a) *arfakianus* (Salvadori); on New Guinea proper.
b) *misoliensis* (Ripley); Misol Island only; like *arfakianus* but bill more slender, feathers of vent paler grey tipped; upper and under tail-coverts duller chestnut.

NESTING Eggs buried in a mound scraped up by the bird; eggs white; size 91 × 60 mm.

REMARKS A mountain forest species.

### *Aepypodius bruijnii* (Oustalet)

Bruijn's Brush Turkey. Length 16–18 in. Adult male: head and neck chiefly naked and with three elongated wattles, one on front of neck and one on each side of neck, and a comb on top of head; upperparts brownish black with the lower rump and upper tail-coverts dark maroon; underparts chestnut-brown becoming dark greyish brown on sides and abdomen; iris hazel-brown; 'fleshy parts of head' coral-red; feet probably blackish brown; wing 305 mm, tail 139 mm, culmen 27 mm, tarsus 104 mm. Female and subadult male similar but without wattles.

RANGE Waigeu Island.

REMARKS Known only from specimens obtained by native collectors in the employ of A. A. Bruijn more than seventy years ago and from one specimen obtained by a native collector in the autumn of 1939.

## Family Phasianidae *Quail* and *Pheasants*

*(165 species, three in New Guinea)*

The pheasant family comprises some 165 species which range in size from little quail a few inches long to peacocks. The range of the family includes all continents, with the greatest number of species and diversity of forms in southern Asia.

Only three closely related species of quail occur in New Guinea where they live on the ground in the grassland and are often not seen until they fly. These quail feed largely on seeds and nest on the ground. The young hatch down-covered and are active from shortly after hatching, when they accompany the parents who care for them.

### Key to *Phasianidae* Species

1 Length 10 in or more (Snow Mountains only): *Anurophasis monorthonyx*.
Length 8 in. or less: 2.

2 Length $5\frac{1}{2}$ in. or more: *Synoicus ypsilophorus.*
Length 5 in. or less: *Excalfactoria chinensis.*

### *Excalfactoria chinensis* (Linnaeus)
also known as *Coturnix chinensis*

Chinese Quail. Length $4\frac{1}{4}$–$4\frac{3}{4}$ in. Adult male: a tiny brownish black quail with black and white on head and neck and blue-grey and reddish brown underparts. In more detail: upperparts dark brown with some narrow whitish shaft striping and profuse blackish marking; forehead, sides of head, sides of neck, breast and sides greyish blue; sides of head below eye, throat and upper breast black with bold white malar streaks and a broad white collar; central breast and abdomen reddish maroon; iris deep red; bill black, blue-grey at base; feet yellow; wing 65–70 mm, tail short concealed in coverts, culmen 10 mm, tarsus 18 mm. Female like male on upperparts but underparts quite different: side of head rufous; upper throat and abdomen buffy, lower throat rufous; breast and sides of body greyish brown barred with black and buffy to ochraceous; iris brown not red.

RANGE Ceylon, India, south-eastern Asia, China, Formosa, Philippine Islands, Malay Archipelago, to New Guinea, Bismarck Archipelago and Australia; sea level to 7,100 ft.

SUBSPECIES IN NEW GUINEA Two fairly distinct ones:

a) *novaeguineae* (Rand); mid-mountain valleys (4,700 to 7,100 ft) of the main body of New Guinea (Wissel Lake Valley, Balim Valley, Telefomin Valley, Mt Giluwe region, Wahgi Valley); central breast and abdomen chestnut-brown. Individuals found in Telefomin Valley may be a separate subspecies.
b) *papuensis* (Mayr and Rand); eastern New Guinea (sea level to 4,000 ft), in the south-west to Oriomo River, in the north-west to middle Watut River (Herzog Mountains); like *novaeguineae* but central breast and abdomen darker, more deep maroon.

NESTING [Nest: a shallow ground depression lined with grasses in grassland. Eggs usually four, pale brown dotted and marked with dark brown; size 17·5 × 14·5 mm. Australian data.]

REMARKS The Chinese quail is fairly common throughout most of its range. Below our camp at Dogwa in south New Guinea was a gentle grassy slope adjoining a small sedge-grown swamp. Horses had grazed over this slope so that some places were close cropped, with tussocks of tall grass in others. Here these quail were very common. They appeared to prefer the short grass and the edge of the heavy grass where they were found singly or occasionally in pairs. They lie close, flush singly

with a little call, and fly but a short distance – twenty to forty yards – and then drop into cover. When in the open or short cover, they usually fly to the nearest dense cover and drop into safety, sometimes no more than ten yards away. Once settled it is difficult to flush them for a second time. One, started in the dense short grass almost underfoot, fluttered through the grass for a short distance so that it was mistaken for a frog until it took wing. In the mid-mountain grasslands the species was most common in old garden lands grown up with weeds. Seeds of grass and small herbaceous plants make up most of its food.

***Synoicus ypsilophorus* (Bosc)**

Brown Quail. Length 6–7½ in. The males especially vary greatly with geography, and the very different extreme populations are connected by intermediate-type populations. In part, this is correlated with altitude.

(A) Grey type. Adult male: underparts nearly uniform grey with only a little dusky freckling in edges of some flank feathers, and throat paler grey; crown brown with or without a pale median line; wing quills mostly brown; rest of upperparts predominantly grey but feathers of back, rump, and some wing-coverts with lateral edgings of dusky brown giving a streaked effect; occasional specimens have the underparts washed with pale reddish brown with obscure black barring on lower breast and flanks, and the dark brown streaking of the upperparts replaced with bright red-brown. Female: upper throat plain buffy, lower throat, breast, and sides of body dull rufous brown with obscure narrow shaft streaks and plentiful, conspicuous black bars; abdomen buffy with some fine, irregular barring; upperparts, crown brownish black with pale central and lateral stripes; wing quills brown; rest of upperparts dark, rather rich brown, the feathers with conspicuous narrow shaft streaks and with blotches of black.

(B) Brown, barred type. Adult male: chin and upper throat plain buffy, lower throat, breast and sides of body dull rufous brown and buffy with dense, wavy black bars; abdomen buffy obscurely barred; upperparts with conspicuous whitish shaft streaks and a fine mixed pattern of buffy, red-brown and black barring. Female is similar to the female of the grey type.

RANGE Eastern Malaysia, New Guinea, Australia and Tasmania (introduced into New Zealand); in New Guinea from sea level to 11,800 ft in grasslands.

SUBSPECIES IN NEW GUINEA The geographical variation of this species is especially interesting in showing increase in size with increase in altitude, and in showing decrease in sexual dimorphism with increase in altitude. The females are all generally similar in pattern. The

sexual dimorphism is greatest in the lowlands, especially in south New Guinea, and least in the alpine country, with mid-mountain populations intermediate. A similar variation in both colour and size exists in the populations spread from the tropics to Tasmania. Six well marked subspecies are recognized.

Lowland Subspecies – Three:

a) *dogwa* (Mayr and Rand); south New Guinea; male of grey type (see above) with underparts clear pale grey, nearly uniform, with occasional specimens with red-brown wash (see above). Sexual dimorphism is greatest in this form. Male wing 84–91 mm, female wing 82–91 mm.

b) *plumbeus* (Salvadori); lowlands of eastern New Guinea (west in south to Yule Island, in north to Huon Peninsula); like *dogwa* but male darker and more sooty grey on underparts, sometimes there are a few black blotches in back feathers; male wing 85–94 mm.

c) *saturatior* (Hartert); lowlands of north New Guinea (Astrolabe Bay to Mamberamo River); like *plumbeus* but male darker and more washed with sooty brown and with obscure barring below and feathers of upper breast with pale shaft streaks; male wing 82–91 mm.

Mid-mountain Grassland Subspecies – Two:

d) *mafulu* (Mayr and Rand); south slopes of south-eastern New Guinea mountains, 3,000 to 5,500 ft; males differ from lowland birds in having underparts buffy white washed with greyish brown or vinaceous on breast and sides of body which are finely barred with wavy lines of black, upperparts with conspicuous narrow white shaft streaks and a fine pattern of bars and vermiculations of brown, black and grey; size larger, male wing 90–97 mm, female wing 89–93 mm.

e) *lamonti* (Mayr and Gilliard); mid-mountain grasslands of Central Highlands (Mt Hagen area), 5,000 to 8,000 ft; like *mafulu* but male with underparts washed with pale chestnut, not greyish brown, and upperparts with richer, more chestnut in the brown; male wing 90–100 mm, female wing 93–98 mm.

Alpine Subspecies – One:

f) *monticola* (Mayr and Rand); alpine grasslands 9,000 to 11,800 ft, in south-eastern New Guinea (Wharton Range); like *mafulu* but sexual dimorphism still less, and size larger; female very like the females of all the preceding races in general patterns; male most like those of *mafulu* but underparts more coarsely marked and more buffy brownish and upperparts lighter more brownish in general colour without grey streaks and black freckling and with more plentiful whitish shaft streaks and coarser and more definite barring; male wing 104–9 mm, female wing 102–3 mm.

NESTING Nest: on the ground, made of grass, among herbaceous vegetation in grassland. Eggs four to six, pointed at one end, dull whitish or buffy spotted with brown or plain greenish white or greenish buffy; size 31 × 24 mm.

REMARKS Rather local, but where known varying from uncommon to fairly common in lowland grasslands and common to abundant in the mid-mountain and alpine grasslands especially where the grass is dense or in tussocks. Usually found in pairs, coveys of up to six or, occasionally, in flocks of fifteen or more. These are secretive birds that remain concealed and flush noisily, usually from close underfoot, often with cackling calls and usually fly close above the grass for 50 to 500 ft before suddenly diving into the grass or preferably into grassland interspersed with bushes growing at the edge of forest. The birds are often very difficult to flush a second time.

***Anurophasis monorthonyx* (van Oort)**

Snow Mountain Quail. Length 10–11 in. Adult male: upperparts blackish brown with buff to deep rufous narrow shaft streaks and broad bars; forehead and side of head around eye more buffy; underparts generally chestnut-brown with indistinct narrow irregular black barring mostly on the upper breast, sides and under tail-coverts; throat and sides of neck mostly clear pale chestnut-brown; wing quills blackish brown with some pale markings on outer vanes; iris dark brown; bill horn, yellow at base; feet yellow; nails greyish; wing 157–61 mm, tail 61–70 mm, exposed culmen 18 mm, tarsus 43 mm. Female: similar but pale areas on underparts much more whitish or buff, less chestnut and much more heavily barred with black; also upperparts with broader pale shaft stripes and darker brown, less conspicuous bars.

RANGE The alpine grasslands (10,300 to 12,850 ft) on Mt Wilhelmina and Mt Carstensz in the Snow Mountains.

NESTING A hollow some seventy mm deep lined with grass, under the edge of a tussock of grass. Eggs three, broadly ovate, slightly glossy, pale brownish with small dark brown spots and dots; size 33 × 45 mm.

REMARKS This little-known bird, closely related to *Synoicus*, was fairly common from the timber line to the upper edge of the grass on Mt Wilhelmina. Near the timber line it was found in areas of tall grass and shrubbery, but not in the forest; it also occurred in areas of short grass on barren ridges, and once a bird flushed from grass and then alighted on a rock. The Snow Mountain quail was found singly and in twos and threes; it flushed noisily, often with a shrill cackling call, and often from nearly underfoot, but sometimes at a distance of 100 yards. It would then fly to denser cover where it was very difficult to flush a

second time. The birds apparently sleep in small groups in forms hollowed out in sedge tussocks. One such form was a cave-like hollow sixteen inches wide by twelve inches deep. The food is varied and includes flower heads, flowers, leaves, and seeds of small herbaceous plants and shrubs; less often caterpillars.

# Order 9 Gruiformes

## Cranes, Rails, and allies

*Twelve families, four in New Guinea*

A very old, world-wide order comprising twelve living and ten fossil families of aquatic or terrestrial birds, some of very peculiar form and habit, some flightless, and some regarded as 'living fossils', i.e., the Kagu of New Caledonia. In New Guinea four of the surviving families occur.

### Synopsis of Families

1 TURNICIDAE Bustard quail; a small, quail-like bird, $4\frac{1}{2}$–6 in. long, but lacking a hind toe; one species; figure 13.

2 GRUIDAE Cranes; long-legged, long-necked birds, 45–49 in. long, with four toes, a rather blunt, moderately long bill and with naked skin on the head; live in grassy marshes or wet plains; one species; figure 14.

3 RALLIDAE Rails, gallinules, swamp hens, coots; small to medium sized, walking and wading and occasionally swimming birds, 6–23 in. long, with short to long bills, very short tails, short rounded wings and well developed feet with four moderate to long toes; live mostly on the ground in forest, grassland or marsh; often very secretive; a few swim readily; eighteen species; figures 15, 16.

4 OTIDIDAE Bustards; long-legged, long-necked birds, 36–48 in. long, with three toes in front and no hind toe; live on open grassland; one species; figure 17.

### Family Turnicidae *Bustard Quails*

*(Thirteen species, one in New Guinea)*

A family of thirteen species of small quail-like birds of the temperate and tropical regions of the Old World. Although they are very like true

quails in ecological preferences, habits and flight characteristics, they are easily separated by the lack of a hind toe (hallux) and for the notable reversal of some of the usual roles of reproductive behaviour. In the bustard quail the female is larger and more brightly coloured, and she takes the aggressive part in courtship and in fighting other females. The female, being polyandrous, concludes her part in the rearing of the young by building the nests and laying the eggs. The males then take over the duties of incubation and rearing of the young, which are down-covered and are soon able to follow the parent. Only one species occurs in New Guinea.

***Turnix maculosa* (Temminck)**

Black-backed Bustard Quail. Length $4\frac{1}{2}$–6 in. Adult female: crown and nape black variegated with dark brown and grey and crown with or without pale median stripe; hind neck with or without (subspecies) rufous collar; rest of upperparts dark grey with conspicuous buffy edgings to some feathers and less conspicuous black bars and spots, and rufous brown bars; side of face to above eyes, throat and breast tawny buff; sides of neck and breast similar but with black spots or bars; abdomen buffy to whitish; iris whitish; bill greyish olive to greyish brown on distal half, darker on culmen and with a yellow base; feet olive-yellow; wing 78 mm, tail short, exposed culmen 12 mm, tarsus 18 mm. Male: similar but duller and much smaller; wing 66 mm, exposed culmen 10 mm, tarsus 18 mm.

RANGE Lesser Sunda Islands to Australia, New Guinea and some satellite islands, and the Solomon Islands.

SUBSPECIES IN NEW GUINEA Three rather well marked ones:

a) *horsbrughi* (Ingram); south New Guinea from Merauke to the Port Moresby districts (near sea level), also the Sudest and Louisiade Islands; female with a chestnut collar on hind neck.
b) *furva* (Parkes); near sea level in the Finschhafen area, Huon Peninsula; female like *horsbrughi* but chestnut collar absent.
c) *giluwensis* (Sims); mid-mountain grasslands (5,200 to 8,000 ft) of Mt Giluwe and the Wahgi Valley regions; female like *furva* but abdomen whitish not buffy.

NESTING [Nest: a shallow grass-lined ground depression under a tuft of grass. Eggs four, oval, whitish profusely speckled and marked with grey; size 22·5 × 17 mm. Australian data.]

REMARKS The bustard quail walks on the ground in grassy country and flushes when an intruder is close; to fly a short distance and drop back into the grass again. It has been found in the mid-mountain grasslands of the Central Highlands and grasslands bordering lowland waterways.

The species has only been found a few times in New Guinea and then at widely separated stations.

## Family Gruidae *Cranes*

*(Fourteen species, one in New Guinea)*

The fourteen known species of cranes – all tall, graceful birds – range widely through the temperate and tropical regions of the world with the exception of South America. Only one species occurs in the Australo-Papuan region. All are long-legged, long-necked birds with long heavy bills. The bill serves as a hammer or spear in killing small snakes and frogs, and also as a tool for excavating roots and other vegetable matter which also serve as food. All cranes have a partially naked head which is red or decorated with plumes, and all engage in colourful group dances in which the female participates nearly as actively as the male. The young are down-covered and able to follow the parent shortly after hatching.

### *Grus rubicunda* (Perry)

Brolga or Australian Crane. Length 45–49 in. Adults: generally dark silvery grey; wing quills, sides of lower head and throat blackish; iris yellow; bill olive-green becoming pale brown on outer third; feet blackish tinged with pink and brown; naked skin of head brownish or olive greyish; papillae on sides of face and back of neck red. Male wing 578 mm, tail 241 mm, exposed culmen 146 mm, tarsus 289 mm. Female smaller: wing 542 mm.

RANGE Northern and eastern Australia and lowlands of southern New Guinea (Frederik-Hendrik Island to Fly River) and north New Guinea (middle Sepik).

NESTING [Nest: eggs placed on bare ground. Eggs two, creamy white, sparsely spotted with brown and lavender; size 84 × 60 to 91 × 62 mm. Australian data.]

REMARKS The crane was referred to as 'Native Companion', or 'Brolga', by Australian residents in south New Guinea, who spoke of it as being common in the Morehead River country near the Dutch border, and on the middle Fly River in the extensive marshes and grass country. However, during the work of the Archbold Expedition in south New Guinea, the crane was found very few times and then only groups of two or three birds were seen flying over the savannah near the coast. Two or three fully grown tame birds were also seen in the possession of natives. The birds were presumably raised in captivity, so the species probably nests.

## Family Rallidae *Rails*, etc.

*(132 species, eighteen in New Guinea)*

This family includes rails, gallinules and coots. It is nearly world-wide in distribution with some 132 species, of which eighteen (fourteen rails, three gallinules and swamp hens and one coot) occur in New Guinea. The rails are small to medium sized birds, ranging from six to twenty-three inches long. They spend their time walking about on the ground in forest or grassland or on the vegetation in marshes, depending on the species. One is flightless and the others usually prefer to run rather than fly, and are very secretive. The gallinules and swamp hen, all medium sized birds ten to seventeen inches long, frequently swim, and the coot by preference swims in open water.

The nest is on the ground or in low bushes or reeds, the eggs are buffy to white and speckled, and the young are clad in black down and follow their parents shortly after hatching.

### Key to Genera of *Rallidae*

1(a) Head and neck all round and breast at least red-brown, sometimes more dusky on crown or throat whitish: 2.
(b) Head and neck all round not red-brown: 3.
2(a) Size larger, length 10–13 in., back uniform blackish brown or olive, tail blackish to black: 11.
(b) Size smaller, length 7–9 in., back uniform red-brown to black or black either spotted or streaked with whitish, tail red-brown, mountain forests: *Rallicula*.
3(a) Flanks at least barred black and white, sometimes whole breast and abdomen barred: 4.
(b) No barring in plumage: 5.
4(a) Barring in upper wing-coverts or in some wing quills: *Rallus*.
(b) No barring in upper wing-coverts nor in wing quills: *Porzana* (part).
5(a) Size small, length 6–7 in.: 6.
(b) Size larger, length 10 in. or more: 7.
6(a) Breast and abdomen slaty grey to blackish: *Porzana* (part).
(b) Breast and abdomen greyish white: *Poliolimnas*.
7(a) Breast and abdomen pinkish red-brown: *Eulabeornis*.
(b) Centre of breast and abdomen whitish: *Megacrex*.
(c) Breast slaty grey to blackish to blue: 8.
8(a) Toes edged with lobes, plumage generally slaty grey with head and neck more blackish, usually a white plate on forehead and bill white, swims duck-like: *Fulica*.
(b) No lobes on toes, plumage slaty to blue, plate on forehead (if present) and bill not white: 9.

9(a) Plate on forehead and very thick bill red, forepart of plumage blue: *Porphyrio.*
(b) Not so: 10.
10(a) Breast grey, under tail-coverts brown, bill green: *Amaurornis.*
(b) Breast slaty, under tail-coverts black and white, base of bill red, frontal shield red-brown: *Gallinula.*
11(a) Mantle blackish brown, wing quills with white bars: *Rallina.*
(b) Mantle olive-brown, wing quills without bars: *Gymnocrex.*

### Synopsis of *Rallidae* Species

1 RALLUS Three species, length 7–14 in.; bill as long or longer than head; underparts greyish or blackish with bold white marking on sides of abdomen; throat (except one species) whitish.

2 PORZANA Two species, length 6–7 in.; bill less than length of head and dark brown or blackish; iris red; small greyish or dark brown to blackish rails.

3 POLIOLIMNAS One species, length 6–7 in.; bill equal to depth of head; plumage above mostly brownish; plumage below mostly greyish to whitish; much white on sides of head and throat.

4 RALLICULA Four species, length 7–10 in.; plumage of underparts, head and neck mostly deep chestnut-brown; back and wings reddish brown or black with white spots or stripes; bill brownish to black.

5 RALLINA One species, length 10–12 in.; bill bright green; fore half of body mostly chestnut-brown; flight quills blackish with white bars.

6 GYMNOCREX One species, length 12–14 in.; bill dark olive-grey to green; forepart of body mostly chestnut-brown; back brownish olive; flight quills chestnut.

7 EULABEORNIS One species, length 20–23 in.; bill greenish yellow to grey; plumage above greyish to greyish green; underparts mostly vinaceous brown.

8 MEGACREX One species, length 14–15 in.; bill dark horn to whitish; upperparts olive to chocolate-brown on rump and tail; underparts brown and white.

9 AMAURORNIS One species, length 8½–11 in.; bill light green; upperparts olive; underparts grey to brown on under tail-coverts.

10 GALLINULA One species, length 10–12 in.; forehead shield and most of bill red; plumage mostly dark grey.

11 PORPHYRIO One species, length 15–17 in.; forehead shield and bill deep red; underparts mostly purplish blue; upperparts mostly blackish. Edges of streams, rivers and lakes.

12 FULICA One species, length 14–16 in.; forehead shield and bill whitish; head and neck black; remaining plumage mostly dark grey. In habits, duck-like.

**Key to *Rallus* Species**

1 Throat black: *torquatus*.
. Throat whitish or grey: 2.
2 Breast with brown band: *philippensis*.
Breast uniform grey: *pectoralis*.

***Rallus pectoralis* (Temminck)**

Slate-breasted Rail. Length 7–7¾ in. Adults: crown, side of head from below eye and hind neck chestnut; back greyish olive or brownish olive streaked with black, sometimes with some white markings; upper wing-coverts and secondaries brownish or blackish barred or notched with white; rump and tail like back but with some white markings; lower side of head grey; throat whitish; lower neck and upper breast pale slate-grey often tinged with olive; remaining underparts barred with black and white or buffy, except for clear whitish on central abdomen; wing quills dusky, sometimes with a few small white bars; iris golden-brown; outer half of bill rose-grey, basal half purplish rose; feet pinkish grey. Male wing 93–109 mm, culmen from base 26–41 mm, tarsus 34 mm. Female similar.

RANGE Mountain grasslands almost throughout New Guinea (except Huon Peninsula); 4,800 to 7,800 ft.

SUBSPECIES IN NEW GUINEA Five similar ones:

a) *mayri* (Hartert); Arfak Mountains; male wing 104–9 mm, culmen 38–39 mm; back feathers edged with olive.
b) *connectens* (Junge); Wissel Lake region, Weyland Mountains; like *mayri* but back feathering suffused with reddish brown.
c) *captus* (Mayr and Gilliard); Snow Mountains and Central Highlands (Victor Emanuel Mountains, Mt Giluwe, Mt Hagen and Wahgi Valley); much like *connectens*.
d) *alberti* (Rothschild and Hartert); mountains of south-eastern New Guinea; like *mayri* but smaller; male wing 94–100 mm, culmen 26–30 mm.
e) *insulsus* (Greenway); Herzog Mountains; much like *alberti*.

REMARKS Judging from the number of specimens trapped by native collectors in areas of dense, dry grassy country, the slate-breasted rail is fairly common in the mid-mountain grasslands of the Central Highlands. In other areas it may be uncommon or rare.

***Rallus philippensis* (Linnaeus)**

Banded Land Rail. Length 10–11 in. Adults: crown streaked black and brown; hind neck rufous brown; back and wing-coverts streaked black and olive and with plentiful white spots; line above eye grey; band

from eye to hind neck rufous brown; chin whitish; throat and fore neck grey; rest of underparts barred black and white except for a cinnamon-brown breast band, and abdomen sometimes clear buffy to whitish; wing quills black conspicuously barred with red-brown and white; iris reddish brown; bill pinkish red, tip horn-coloured; feet brownish fleshy. Male wing 137–40 mm, tail 64 mm, culmen from base 31 mm, tarsus 44 mm.

RANGE Philippines, Celebes, Moluccas, Lesser Sunda and Cocos Keeling Islands, Admiralty and Bismarck Archipelagos, New Guinea, Australia, Tasmania, Norfolk Island, New Caledonia, New Hebrides, Fiji, Samoa and Tonga Islands. In New Guinea lowlands to 11,000 ft.

SUBSPECIES IN NEW GUINEA Five similar ones:

a) *yorki* (Mathews); north Queensland, south and west New Guinea, east in the north-west to head of Geelvink Bay, and east in the south to the Merauke district.
b) *reductus* (Mayr); north-east New Guinea from China Straits east to Astrolabe Bay and Long Island.
c) *wahgiensis* (Mayr and Gilliard); Wahgi Valley region and Mt Giluwe and at low altitudes on the north slopes of the Snow Mountains.
d) *randi* (Mayr and Gilliard); Mt Wilhelmina region at higher altitudes.
e) *lacustris* (Mayr); Lake Sentani region.

NESTING [Nest: a flimsy cup of grass on the ground under a tussock of grass. Eggs five to nine; pinkish white marked with red, purple and grey; size 32 × 24 to 36 × 26 mm. Incubation period: eighteen to nineteen days. Australian data.]

REMARKS This species was locally common to abundant in wet grasslands between sea level and 10,600 ft. In the Wahgi region it was usually encountered in tall, swampy 'pit-pit' grasslands. On Mt Wilhelmina one was observed as it walked about on mud in an area of tall grass, and others were flushed from grassland and second-growth areas.

### *Rallus torquatus* (Linnaeus)

Barred Rail. Length 13–14 in. Adults: upperparts uniform olive-brown except rump which is blackish with narrow white barring; sides of head and throat uniform black except for a white stripe below eye; underparts black with prominent white bars; undersurface of wing fuscous with white barring; iris red; bill brown; feet brown. Male wing 151 mm; tail 59 mm; exposed culmen 47 mm; tarsus 60 mm.

RANGE Philippine and Celebes Islands, and locally to north-western New Guinea.

SUBSPECIES IN NEW GUINEA One, *limarius* (Peters); Salawati Island and adjacent coast of Vogelkop to Dorey Hum.

NESTING [Nest on ground. Eggs three to four, creamy white sparingly marked with red, brown and lilac; size 38 × 28·5 mm. Philippine data.]

REMARKS Apparently the barred rail is quite rare in New Guinea. Its home is in lowland coastal swamps.

**Key to *Porzana* Species**

Breast greyish white, flanks barred: *pusilla*.
Breast dark slate-grey, no barring on body: *tabuensis*.

***Porzana pusilla* (Pallas)**

Marsh Crake. Length 6–7 in. Adults: upperparts variegated; crown and neck brown streaked with blackish; back dark clay-brown boldly streaked with black and streaked and spotted with white; wing-coverts and inner secondaries like back; sides of neck to sides of breast chestnut-brown; wing quills mostly uniform brown except narrow white leading edges on outer primaries and some fine white spotting on secondaries; chin whitish; side of head, neck and upper half of breast uniform pale grey changing to whitish on abdomen; flanks and under tail-coverts barred black and white; iris orange-red; bill green with a grey ridge; feet greenish grey to pale green. Male wing 76–79 mm, tail 39–42 mm, culmen 15 mm, tarsus 24 mm.

RANGE Africa, Madagascar, Eurasia, Japan, Philippines, Malay Archipelago, New Guinea, Australia, Tasmania and New Zealand.

SUBSPECIES IN NEW GUINEA One, *mayri* (Junge); known only from the Wissel Lake region, Weyland Mountains (5,000 ft).

NESTING [Nest: a saucer of rushes in a swamp. Eggs four to five, dark olive with dark spots; size 25 × 19 to 28 × 20 mm. Australian data.]

REMARKS The marsh crake is apparently rare and very local. The only records in New Guinea are four specimens taken in the Wissel Lake region in 1939.

***Porzana tabuensis* (Gmelin)**

Sooty Rail. Length 6–7 in. Adults: upperparts including wings pale to dark chocolate-brown; underparts and head all round and tail slate-grey to sooty black, except chin whitish to sooty grey; under wing-coverts brown and dull white; under tail-coverts black with white bars;

iris and complete eye-ring dark red to scarlet; bill black; feet salmon. Male wing 82–89 mm, tail 47 mm, exposed culmen 16–22 mm, tarsus 28–30 mm.

RANGE Philippine Islands, New Guinea, New Britain, Vuatom Island, New Zealand, Chatham Islands, New Caledonia, islands of the south-west and south Pacific; 2,500(?) to 10,300 ft in New Guinea.

SUBSPECIES IN NEW GUINEA Two similar ones and one well differentiated:

a) *tabuensis* (Gmelin); wide-ranging in Pacific islands (see above) and New Guinea (Anggi Lakes, Arfak, Balim Valley, Astrolabe Bay region); back light chocolate-brown, underparts slate-grey, chin usually whitish.
b) *richardsoni* (Rand); Lake Habbema, Oranje Mountains (10,300 ft); like *tabuensis* but back paler more olive-brown and bill averaging shorter.
c) *edwardi* (Gyldenstolpe); Wahgi Valley (5,000 ft); like *tabuensis* but back darker more dark chocolate-brown and bill averaging longer.

NESTING [Nest: a cup of grass in a tussock of reeds in a swamp or over water. Eggs four to five, greenish grey to straw-colour, marked lightly with browns and lavenders; size 30 × 22 mm. Australian data.]

REMARKS The tiny sooty rail is a common but elusive species and local in occurrence in marshy grass areas bordering highland lakes and rivers. At Lake Habbema it was occasionally seen darting from one clump of grass to another and sometimes it could be forced into taking a short flight. Its calls – sharp, oft-repeated kips and kups and a low bu-u-u-u – were often heard. In boggy places along the Wahgi River and in wet grasslands near Nondugl in the Central Highlands the species is also fairly common.

### *Poliolimnas cinereus* (Vieillot)

White-browed Rail. Length 6–7 in. Adults: crown and nape blackish; rest of upperparts greyish brown to dark brown, the feathers of mantle and rump with paler, more olive edgings; white line from bill to above eye; area about eye black; cheeks grey with white line below eye; chin and throat white; upper breast and sides of breast grey changing to buffy brown on flanks and under tail-coverts; lower breast and abdomen white; iris dark red; eye-ring light red; bill olive at tip shading to reddish brown at base; feet greenish olive. Male wing 89–92 mm, tail 49 mm, exposed culmen 21 mm, tarsus 36 mm. Female slightly smaller. Downy young black.

RANGE Philippines, Malay Archipelago, New Guinea region, Australia,

widespread in Micronesia, Polynesia including New Caledonia, the New Hebrides and east to Samoa; lowlands.

SUBSPECIES IN NEW GUINEA One, *minimus* (Schlegel). (Also known as *leucophrys*.) Ceram, Batjan, Moluccas, New Guinea (Utanata River, Fly River south coast of south-east New Guinea, Astrolabe Bay, Sepik River, Sentani Lake, Fergusson Island), and Bismarck Archipelago.

NESTING [Nest: of grasses on ground. Eggs three to six, greenish or buffy white, streaked weakly with browns. Australian data.]

REMARKS Usually a fairly common but very secretive species, living in dense mats of floating vegetation bordering lakes and rivers. However, S. D. Ripley records seeing birds running freely over lily pads and floating lake vegetation almost as easily as jacanas.

### Key to *Rallicula* Species

1 Back uniform reddish brown: 2.
Back not uniform reddish brown: 3.
2 Wing more than 105 mm (Cyclops Mountains only): *R. mayri* (male).
Wing less than 100 mm (not in Cyclops Mountains): *R. rubra* (male).
3 Back uniform black: *R. forbesi* (male).
Back not uniform black: 4.
4 Back black with white streaks (Arfak Mountains) (male): *R. leucospila* (male).
Not so: 5.
5 Back black with white or yellow spots: 6.
Back reddish brown with buff and black spots (Cyclops Mountains only): *R. mayri* (female).
6 Back black with white spots (Arfak Mountains only): *R. leucospila* (female).
Back black with buffy or yellow spots: 7.
7 Tail feathers uniform red-brown: *R. rubra* (female).
Tail feathers with black bars: *R. forbesi*.

### *Rallicula rubra* (Schlegel)

Chestnut Rail. Length 7–9 in. Adult male: generally uniform reddish chestnut (in one subspecies tinged black on nape and hind neck, and dorsal feather-shafts blackish); abdomen dull reddish brown; tail uniform reddish brown; wing quills dark brown with white bars; iris brown; bill blackish with tip and base of mandible greyish; feet blackish; wing 91–100 mm, tail 65 mm, exposed culmen 23–25 mm, tarsus 36 mm. Female: similar, but slightly smaller; mantle and wings black with small buff to white spots, and abdomen and thighs mostly brown with traces of black and buff barring.

RANGE Western half of New Guinea from about 5,000 to 10,000 ft.

SUBSPECIES Four fairly well marked ones.

a) *rubra* (Schlegel); Arfak Mountains; male upperparts deep vinaceous chestnut with traces of black shafting and with nape tinged with black.
b) *klossi* (Ogilvie-Grant); Weyland, Nassau and Oranje Mountains at low altitudes; like *rubra* but male paler, without black nape or dorsal feather shafting, and smaller (wing 91 mm).
c) *subrubra* (Rand); Mt Wilhelmina, Oranje Mountains and Wissel Lake, Weyland Mountains between 5,000 and 10,000 ft; like *klossi* but larger (wing 94–100 mm).
d) *telefolminensis* (Gilliard); Victor Emanuel and Hindenburg Mountains; like *klossi* but male darker.

REMARKS Apparently an abundant although little known species of the mountain forest floor. Virtually all specimens in collections have been obtained from native trappers.

### *Rallicula mayri* (Hartert)

Mayr's Chestnut Rail. Length 8–9 in. Adult male: upperparts uniform dark reddish brown; underparts chestnut-brown; tail like upperparts but with indistinct narrow black bars; wing quills blackish brown with broad white bars; iris grey-brown; bill and feet black; wing 114–17 mm, tail 68 mm, exposed culmen 22 mm, tarsus 37 mm. Female slightly smaller: wing 109 mm, tail 64 mm, exposed culmen 23 mm, tarsus 35 mm; and with mantle and wings with large composite black, buff-centred spots; abdomen and thighs with indistinct blackish barring.

RANGE Known only from the Cyclops Mountains between 3,800 and 6,800 ft.

REMARKS Mayr's chestnut rail is fairly common on the floor of the Cyclops mountain forest.

### *Rallicula forbesi* (Sharpe)

Forbes's Chestnut Rail. Length 8–10 in. Adult male: fore half of body including all of head to middle of abdomen chestnut-brown, slightly darker on upperparts; remaining portions of mantle black becoming chestnut with fine black barring on upper tail-coverts and tail; wing quills blackish with large white bars and spots on undersurface; abdomen and under tail-coverts greyish brown to reddish brown with black bars; iris golden-brown; bill dark brown; feet brownish black; wing 105–17 mm, tail 62–79 mm, exposed culmen 29 mm, tarsus 38 mm. Female: similar but black of upperparts vividly spotted with pale

buffy white and slightly smaller. Subadult: blackish brown above and dull reddish brown below, generally barred with black.

RANGE Mountains of eastern and central New Guinea; 3,800 to 9,700 ft.

SUBSPECIES Three similar ones:

a) *forbesi* (Sharpe); mountains of south-eastern New Guinea to Herzog Mountains; lower back black, tail in males 70–79 mm.
b) *steini* (Rothschild); Snow Mountains to Central Highlands (Weyland, Oranje, Hindenburg, Hagen, Kubor, and Bismarck Mountains); like *forbesi* but tail in male shorter, 62–67 mm.
c) *dryas* (Mayr); Saruwaged Mountains; like *forbesi* but back dark olive-brown.

REMARKS A common but very shy bird of mountain woodlands where ground cover is plentiful and concealment easy. It travels in little parties, the birds sometimes calling, 'ko ko ko', or occasionally crying harshly or giving low chuckling notes. The species feeds chiefly on insects but also eats some seeds. On Mt Wilhelm at 9,500 ft an arboreal roosting nest of leaves and moss was found nine feet up in the heart of a pandanus palm. Two adult males and one adult female were taken as they slept in this nest; a few hours earlier another male had been taken in the same nest.

***Rallicula leucospila* (Salvadori)**

White-striped Chestnut Rail. Length 8–9 in. Adult male: mantle (except crown and neck) black, each feather with two narrow white stripes (one on each vane); head, neck all round, breast chestnut-brown, palest on throat and becoming sooty brown on crown and nape; abdomen brown obscurely barred; tail-coverts and tail reddish chestnut with narrow black bars; wing quills dark grey with broad white bars; iris olive-brown; bill dark brown, paler at lower base; feet black; wing 108–14 mm, tail 68 mm, exposed culmen 24 mm, tarsus 38 mm. Female: slightly smaller and black areas of mantle spotted, not striped, with white.

RANGE Mountains of Vogelkop (Arfak and Tamrau) and Wandammen Mountains at head of Geelvink Bay; between 4,500 and 5,600 ft.

REMARKS A shy secretive species of the mountain forest floor. Papuan hunters claim that the birds sleep in pairs by night in nests of dried leaves and moss (Ripley).

***Rallina tricolor* (G. R. Gray)**

Red-necked Rail. Length 10–12 in. Adult male: head and neck all round to upper back and upper breast bright chestnut, paler below and buffy

on throat; rest of upperparts sooty olive; rest of underparts sooty olive with narrow chestnut-brown to buffy or whitish bars on abdomen, flanks and under tail-coverts; axillaries, under wing-coverts and wing quills blackish with bold white bars; iris red; bill green with dark tip and maxilla base; feet black; wing 141–57 mm, tail 72 mm, exposed culmen 29 mm, tarsus 56 mm. Female: slightly smaller.

RANGE Eastern Indonesia (Damar and Tanimbar Islands), New Guinea, Bismarck Archipelago and northern Australia; in lowlands.

SUBSPECIES IN NEW GUINEA Two similar ones:

a) *tricolor* (G.R.Gray); Damar Island, Tanimbar Island, Misol Island, Aru Islands, Batanta Island(?), Japen Island, Karkar Island, and all New Guinea; abdomen and flanks moderately barred; male wing 141–50 mm.
b) *maxima* (Mayr); Waigeu Island; like *tricolor* but abdomen and flanks more heavily barred; male wing 152–6 mm.

NESTING Nest: a flat structure of leaves, etc., on the ground. Eggs three, white; size 38 × 29 mm.

REMARKS The red-necked rail is a shy species of the lowland swamp forests and marshes.

### *Gymnocrex plumbeiventris* (Gray)

Bare-eyed Rail. Length 12–13 in. Adults; forepart of body from head to upper back and upper breast bright chestnut-brown, in some plumages becoming buffy or greyish on throat; mantle yellowish olive to brownish olive, becoming black (or blackish suffused with dark brown) on rump and tail; lower breast and abdomen dark ash-grey, in some (sub-adult?) plumages tinged with rufous; under tail-coverts and tail black; axillaries and under wing-coverts greyish black with broad white tips; primaries mostly bright chestnut; secondaries olive-brown; iris light brown; eyelids salmon; skin of face flesh; bill olive-grey with light tip, base, below nostril, yellowish green; feet salmon. Male wing 184–94 mm, tail 67 mm, exposed culmen 47 mm, tarsus 58 mm. Female similar.

RANGE Northern Moluccas, Misol Island, New Guinea, Aru Islands, Karkar Island, New Ireland; lowlands.

SUBSPECIES IN NEW GUINEA Two similar ones:

a) *plumbeiventris* (Gray); northern Moluccas, Misol Island, New Guinea except south, Karkar and New Ireland; abdomen uniform dark ashy grey, head clear rufous brown.
b) *hoeveni* (Schlegel); Aru Islands and south New Guinea between the Setekwa and Fly Rivers; like *plumbeiventris* but underparts duller grey and more washed with rufous brown, head and neck duller.

NESTING Natives of the middle Sepik region told us that it nests during the period of low water, building a grass nest on the ground, and that it lays white eggs.

REMARKS The bare-eyed rail, although not uncommon, is a very shy species of swamps and wet grasslands bordering lowland rivers and lakes.

***Eulabeornis castaneoventris* (Gould)**

Chestnut-bellied Rail. Length 20–23 in. Adults: mantle greenish grey; crown, side of head and nape blue-grey; midline of throat whitish; underparts including under wing-coverts vinaceous chestnut to chestnut-maroon (on under tail-coverts), paler on lower neck and central abdomen; thighs grey; flight quills brown to olive-brown; iris red; bill greenish yellow except distal third greyish white; feet light yellow. Male wing 217 mm, exposed culmen 57 mm, tarsus 73 mm. Female: smaller, wing 194 mm.

RANGE Aru Islands and northern coasts of Australia near sea level.

SUBSPECIES IN NEW GUINEA One, *sharpei* (Rothschild); Aru Islands.

NESTING [Nest: a flat unlined structure of sticks on a sloping mangrove branch. Eggs four, pinkish white, sparsely dotted with reddish brown. Australian data.]

REMARKS [The chestnut-bellied rail is a shy inhabitant of mangrove swamps where it lives on the muddy floor, feeding on crabs, small shellfish and insects. When threatened it runs rather than flies to escape. Australian data.]

***Megacrex inepta* (d'Albertis and Salvadori)**

New Guinea Flightless Rail. Length 14–15 in. Adults: forehead grey; crown and hind neck dull reddish brown; mantle dull greyish olive tinged amber on upper back; (sometimes feathers edged with buff or grey); rump and tail dark reddish brown; wing quills dark brown; sides of head pale grey; throat, centre of breast and abdomen white; sides of neck, sides of breast (sometimes whole breast) and flanks vinaceous buff to greyish olive; iris reddish brown; bill apple-green washed with blackish; feet black. Female wing 174–82 mm, tail 31 mm, exposed culmen 70 mm, tarsus 86 mm. Male apparently similar. Downy young: brownish black below, darker above, black on head.

RANGE Known only from lowlands of north and south New Guinea.

SUBSPECIES Two similar ones:

a) *inepta* (D'Albertis and Salvadori); south New Guinea from Setekwa,

Noord, Digul and Fly Rivers; brownish or vinaceous brown on sides of neck and body; flanks pale; rump, upper tail-coverts and primaries dark brown.

b) *pallida* (Rand); Idenburg River, Humboldt Bay and Sepik River; like *inepta* but generally paler; more buffy not brownish or vinaceous brown on sides of neck and body.

REMARKS This New Guinea flightless rail is apparently a wary resident of mangrove swamps and river-edge bamboo thickets. D'Albertis found that in escaping danger it ran swiftly in the forests. In the dry season he found it along watery ditches. One specimen taken by the 1942 Archbold Expedition was caught by hand when it walked through bamboo thickets (bordering the Fly River) into the expedition's camp. This specimen was kept tethered for a time. A striking feature of its activities was an upward flitting of the wings as it walked or ran, an action that probably would be conspicuous in the wild. The bird occasionally gave a short, complaining, whistled call. Ripley reports that it has a harsh but shrill call, not unlike the squealing of a small pig; that it roosts in trees at night; and that it can frighten off a dog by kicking and stabbing until it can escape by climbing into a tree.

### *Amaurornis olivaceus* (Meyen)

Rufous-tailed Moorhen or Gallinule. Length 8½–12 in. Adult male: upperparts including top of head and neck brownish olive to dark olive-brown, darkest on rump, upper tail-coverts and tail; sides of head, neck and underparts generally grey tinged olive on sides of body; and with abdomen and under tail-coverts buffy to dark umber-brown; throat often paler and sometimes whitish; iris reddish to brownish; bill jade-green, more brownish on top; sometimes a small yellowish or yellowish orange frontal shield; feet dull gold, nails tan; wing 130–57 mm, tail 48–58 mm, exposed culmen 30–33 mm, tarsus 53 mm. Female: similar except abdomen somewhat brighter.

RANGE Philippines, Moluccas, New Guinea, Bismarck Archipelago and northern Australia; sea level, rarely up to 5,000 ft.

SUBSPECIES IN NEW GUINEA Two similar ones:

a) *moluccanus* (Wallace); Moluccas (Sangir and Siao Island), Misol, Biak and New Guinea except the south; abdomen and under tail-coverts generally dull brown; male wing 130–51 mm; (possibly *frankii* should be used for the north New Guinea birds).

b) *ruficrissum* (Gould); northern Australia and south New Guinea (Daru, Oriomo River and Yule Island area); abdomen generally lighter more cinnamon or chestnut-brown; male wing 157 mm.

NESTING [Nest: open, of grasses, concealed in a tuft of grass. Eggs four to six, whitish, marked with brown and greys. Australian data.]

REMARKS Apparently not uncommon but very shy and secretive on the floor of swamp forests bordering marshes and lagoons. However, two were found climbing about in dense stands of low shrubs in a deeply flooded area fringing an Idenburg River lagoon; they gave low, harsh, croaking calls.

***Gallinula tenebrosa* (Gould)**

Dusky Moorhen or Gallinule. Length 10–12½ in. Adults: dark greyish to blackish (darkest on head, palest and often finely tipped with grey on abdomen); sometimes suffused with olive on back; under tail-coverts white; iris dark brown to red; bill dark red with yellow tip; frontal shield orange-red to olive-brown; feet yellowish grey to orange-brown. Male wing 170–201 mm, tail 68 mm, bill from base of frontal shield 46–49 mm, tarsus 55 mm.

RANGE Islands of the East Indies from Borneo, Celebes, Moluccas, Ceram to New Guinea and Australia.

SUBSPECIES IN NEW GUINEA Two, well differentiated:

a) *frontata* (Wallace); south-eastern Borneo, Lesser Sunda Islands, Celebes, southern Moluccas, New Guinea (Vogelkop in west and Hall Sound and Laloki River region in south-east); frontal shield bright orange-red; wing 198–201 mm; mantle strongly suffused with olive.
b) *neumanni* (Hartert); Sentani Lake and middle Sepik River; wing 170–82 mm; mantle blackish.

NESTING [Nest: open, of reeds and grasses, placed in a tussock of grass. Eggs five to seven, sometimes ten; whitish, dotted and spotted with browns and purples. Australian data.]

REMARKS Apparently not uncommon along the margins of certain streams and lakes in the lowlands; but local in distribution.

***Porphyrio porphyrio* (Linnaeus)**

Purple Swamp Hen. Length 15–17 in. Adult male: conspicuous red bill and frontal shield covering front half of crown; plumage of rest of crown and upperpart of hind neck black; lower half of hind neck deep blue; rest of upperparts black except for a cerulean blue patch on lesser wing-coverts; side of head black; side of neck deep blue; underparts: chin and upper throat black changing to cerulean blue (or dark, deep blue) on fore neck and upper breast; lower breast and flanks deep blue; abdomen black; under tail-coverts white; undersurface of tail and

wings blackish except for blue of some under wing-coverts; iris red to reddish brown; bill red; frontal shield scarlet-red; feet dull pink; wing 223–75 mm, tail 88 mm, culmen from base of frontal shield 60–70 mm, tarsus 87 mm. Female: slightly smaller and with legs paler, more greyish rose.

RANGE Southern Asia from Caspian Sea to Malaya, Malay Archipelago, New Guinea and Australian areas, Bismarck Archipelago and some Pacific islands; in New Guinea very local in occurrence; sea level to 5,000 ft.

SUBSPECIES IN NEW GUINEA TWO:

a) *melanopterus* (Bonaparte); near sea level in Moluccas, Aru Islands, Vogelkop, all of northern New Guinea, eastward to islands of south-eastern New Guinea (Misima, Woodlark, Trobriands); upper breast often cerulean blue, lower breast violet-purple; male wing 223–38 mm.
b) *melanotus* (Temminck); Australia, and in New Guinea at Wissel Lakes (5,000 ft), Balim Valley and Galley Reach; like *melanopterus* but usually underparts uniform violet-purple; size larger, male wing 246–75 mm.

NESTING [Nest: open, of reeds and rushes, on a platform of reeds. Eggs five to seven, pale brown to buffy, evenly spotted and blotched with purples and browns. Australian data.]

REMARKS The swamp hen may be fairly abundant as along the Sepik River, or common on a small piece of marsh only as on the Idenburg River in 1938–9, or completely absent as in the extensive Fly River marshes in 1936 despite the apparently suitable habitat. The habitat includes floating grass mats fringing waterways, bushes and tall grass over flooded marshes, floating islands in large lowland rivers, and native gardens. When present it is conspicuous. Along the Sepik River it was frequently encountered in pairs which had the habit of climbing rather fearlessly five feet or so up in cane grass or bushes to peer out at passing boats. When cornered, the bird takes to the water to swim to safety. In the Sepik River region it is believed to change at will into a snake, frog or lizard. The swamp hen is very noisy at night, especially on bright nights. The calls, which are loud and explosive, are periodically given by groups of birds and in the Sepik River region are features of the night forest.

### *Fulica atra* (Linné)

Black Coot. Length 14–16 in. Adults: head and neck all round black; elsewhere generally mouse greyish to slate-black; iris dark red; bill white with tip grey; frontal plate white; feet grey. Male wing 184–212

mm, tail 48–61 mm, culmen from back edge of frontal shield 48–60 mm, tarsus 53–60 mm. Female: slightly smaller.

RANGE Eurasia, Africa, India (in migration to Java, Sumatra, Borneo, Celebes), New Guinea, Australia and Tasmania; sea level to 11,900 ft.

SUBSPECIES IN NEW GUINEA Probably two:

a) *novaeguineae* (Rand); lakes of Mt Wilhelmina region, Snow Mountains (10,200 to 11,900 ft); underparts dark slate-grey; male wing 200–12 mm, female wing 190–202 mm.

b) *subspecies* (?); Anggi Lakes, Vogelkop (6,400 ft); like *novaeguineae* but underparts mouse-grey; male wing 184–7 mm.

NESTING [Nest: bulky, open, of aquatic plants, over water in bushes or reeds. Eggs seven to ten, buffy, dotted and spotted with browns and greys. Australian data.]

REMARKS The coot was common on Lake Habbema where birds were in flocks swimming out in the lake. Apparently uncommon at Anggi Lakes.

## Family Otididae *Bustards*

*(Twenty-three species, one in New Guinea)*

This is a family of twenty-three species (eleven genera), which has its headquarters in Africa, but a few species occur in Eurasia and Australia. All are medium to large sized, chiefly terrestrial birds which occur on grassy plains and semi-deserts. All are three-toed, long-legged birds with well developed wings. In flight the neck is carried straight forward and the long legs are trailed straight backward in a typical manner. On the ground they walk with crane-like stateliness. Males are usually much larger and somewhat more colourfully adorned than the females; they often develop spectacular ornaments during the breeding season, for example the Australian species (*Choriotis australis*) develops an immense inflatable 'bib' which droops to the ground from the upper breast like a feather apron.

### *Choriotis australis* (Gray)

Australian Bustard. Length 36–47 in. Adult male: crown and nape with short crest black; hind neck white; finely barred dark brown; rest of upperparts mostly dark brown vermiculated with buff except for a patch of black and white feathers in upper wing-coverts, and outer wing quills being brown with pale bar, complete or incomplete, and outer tail feathers which are black with white, more or less barred tips; underparts: throat, sides of head, sides of throat, sides and front of

wings blackish except for blue of some under wing-coverts; iris red to reddish brown; bill red; frontal shield scarlet-red; feet dull pink; wing 223–75 mm, tail 88 mm, culmen from base of frontal shield 60–70 mm, tarsus 87 mm. Female: slightly smaller and with legs paler, more greyish rose.

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neck, and forebreast white finely barred with black and tinged buffy; lower breast and abdomen white, with irregular dark grey or black patches on middle and sides of breast and sides of body; iris yellowish to yellowish brown; bill yellowish to greyish horn; 'legs' and feet olive to greyish; wing 553 mm, tail 235 mm, exposed culmen 66 mm, tarsus 196 mm. Female: less black on wings and body, and smaller; wing 515 mm, tail 205 mm, exposed culmen 52 mm, tarsus 175 mm. Weight up to 32 lb., wing spread up to 7 ft; female up to 14 lb.

RANGE Australia and south New Guinea.

NESTING [No nest; eggs are deposited on bare ground in tall grass or under a bush. Eggs one or two, buffy or olive-buff, marked with brown. Australian data.]

REMARKS The only New Guinea records of this species are from the savannah country of extreme southern New Guinea. Rand and Brass observed individuals in early January (at Tarara), the season when the species breeds on Northern Queensland.

# Order 10 Charadriiformes

## Shore Birds, Terns, Gulls, etc.

*Sixteen families, nine in New Guinea*

### Synopsis of Families

1 JACANIDAE Jacanas; generally rail-like but with very long toes and nails, especially the hind toe; wings pointed; walks over floating vegetation; shy but not secretive; flies well; one species, length 8–9 in.; figure 18.

2 HAEMATOPODIDAE Oystercatchers; large black and white shore bird with large red bill; only three front toes; lives on edge of the sea; one species, length 15–20 in.; figure 19.

3 CHARADRIIDAE Plovers; small to medium sized shore birds, 6–15 in. long, with hind toe absent or rudimentary; bill often constricted towards middle; birds of sand beaches, muddy flats, and less often of grassland or gardens; fly, walk and run well; seven species; figure 20.

4 SCOLOPACIDAE Sandpipers, etc.; shore birds 5–24 in. long; hind toe present (absent in one species); bill not constricted near middle; most species of beaches and muddy shores, a few in marshes, one on forest floor; usually run, walk and fly well, often in flocks; seventeen species; figure 21.

5 RECURVIROSTRIDAE Stilts and avocets; very slender, tall, long-legged, sandpiper-like birds of shallow marshes and shores; one species, length 14–15 in.; white with a black mantle; hind toe absent.

6 PHALAROPODIDAE Phalaropes; small, sandpiper-like birds; four toes with lobes or webs on sides of three front toes; usually in flocks swimming in the open ocean; one species, length 7–10 in.

7 BURHINIDAE Thick-knees or stone curlew; a stout, long-legged, plover-like bird about 20 in. long with a heavy bill about 3 in. long and deepest towards middle; hind toe absent; tarsus covered with hexagonal scales; a bird of beaches and reefs; one species; figure 22.

8 GLAREOLIDAE Pratincoles and coursers; very distinct in appearance; 8–10 in. long; somewhat plover-like in appearance but bill short,

wing very long and legs medium to rather short; a comb-like serration on middle toe; two species; figure 23.

9 LARIDAE Terns and gulls; medium to large, long-winged, flying birds 8–30 in. long with front three toes only webbed; bill rather straight and pointed (or with curved tip in gulls); birds of beaches, coastal waters, and occasionally of marshes; terns usually dive into the water for food or snatch it from the surface; fourteen terns and one gull (a straggler); figure 24.

## Family Jacanidae *Jacana*

*(Seven species, one in New Guinea)*

This is a small family of seven species of marsh birds which live in the warmer parts of the Old and New Worlds. One species, eight to nine inches long, occurs in New Guinea and is immediately recognizable by its colour, its rail-like form, its bright comb, very long toes and nails, and its habit of walking about in the open on floating marsh vegetation. The food of Jacanas is supplied by small animal life; insects, fish, etc., found in the marsh, and also seeds of the marsh plants.

### *Irediparra gallinacea* (Temminck)

Jacana. Length 8–9 in. Adults: fleshy 'comb' on fore-crown reddish orange; hind crown to foreback black; centre of back, scapulars and upper wing-coverts pale bronzy brown or very dark bronzy brown to almost black depending on the subspecies; wing quills, rump and tail blackish; black line from gape to eye, otherwise side of head, side of neck and lower throat golden-buff; chin and most of throat white; breast and flanks black; abdomen and under tail-coverts white; iris yellow to brown; bill, distal half black, base and wattle-comb orange to yellow; feet greenish grey. Male wing 121 mm, tail 36 mm, bill 25 mm, tarsus 50 mm, hind toe 20 (with claw 80) mm. Female larger: wing 140 mm. Immatures have top of head rufous, back feathers edged with rufous, and underparts all white.

RANGE Borneo, Philippines, and Lesser Sunda Islands to New Guinea and northern and eastern Australia.

SUBSPECIES IN NEW GUINEA Two:

a) *novaeguinae* (Ramsay); Aru Islands, Misol, Fergusson, Goodenough Islands and New Guinea except the south; back very dark.

b) *novaehollandiae* (Salvadori); north and eastern Australia and southern New Guinea from Setekwa River to Fly River; like *novaeguineae* but back much paler.

NEST [A scant, flat structure in the open on floating vegetation. Eggs

four, buffy brown, scrawled all over with lines of brownish black; size 31 × 21 mm. Chicks hatch covered with patterned down and follow parents about at once. Australian data.]

REMARKS The jacana is fairly common locally, walking about on the floating vegetation of large marshes. When alarmed it flies to a distance, unlike rails which seek concealment. Its food seems to be seeds and green vegetation.

## Family Haematopodidae *Oystercatchers*

*(Four species, one in New Guinea)*

Occurring on all five continents and many islands, the oystercatchers form a small family of four species, only one of which occurs in the New Guinea area. The oystercatcher is easily recognized as a large shore bird with black and white plumage and a big red bill, walking or running over the beach. Its food is shellfish and sand worms from the beaches. The nest is on the ground and the down-covered young are active from hatching.

### *Haematopus ostralegus* (Linnaeus)

Pied Oystercatcher. Length 19 in. Adults: black with rump, upper tail-coverts, lower breast and abdomen white; tips of secondaries also white; iris red; bill red; legs red. Wing 270 mm, tail 120 mm, culmen 83 mm, tarsus 57 mm.

RANGE Locally on coasts of the Americas, Europe, Asia (on some inland waters), southern Africa, New Guinea, Australia and New Zealand.

SUBSPECIES IN NEW GUINEA One, *longirostris* (Vieillot); coasts of Tasmania and Australia north to Kei and South-east islands, Aru Islands, south coast of New Guinea (Utanata River and Orangerie Bay), islands of Torres Straits and Misima Island.

NEST [Eggs laid in a shallow scrape near the sea-shore; eggs two, grey spotted with brown; size 63 × 42 mm. Australian data.]

REMARKS The oystercatcher seems a scarce bird on the New Guinea coasts, and individuals present may be non-breeders from farther south.

## Family Charadriidae *Plover*

*(Sixty-five species, seven in New Guinea)*

Plovers have nearly a world-wide distribution with some sixty-five

species. Some nest in the Arctic and migrate in numbers across the tropics. In the New Guinea area seven species are known to occur, of which only two are residents, the other five being migrants from Asia. Some species are birds of the sea beaches and mudflats where they mingle with sandpipers; while others also feed in grassy fields, eating insects and other small invertebrates. Young plover hatch down-covered and soon follow their parents on foot.

**Key to *Charadriidae* Species**

1 Size large, length 13 in.; conspicuous wattle on face and spur on bend of wing: *Lobobyx.*
Size smaller, 6–12 in.; no wattle or spur: 2.

2 Size 11–12 in.; rump whitish, axillaries black: *Squatarola.*
Size 6–10 in.; rump dark like back, axillaries grey or white: 3.

3 Length 9–10 in.; back mottled golden-buff and blackish: *Pluvialis.*
Length 6–10 in.; back grey or greyish brown, without mottling, but feathers may be margined with buff or grey: 4.

4 Length 9–10 in.; broad breast band buffy or ochraceous: *Eupodia.*
Length 6–9 in.; a narrow band, often interrupted in midline, of buffy, ochraceous, grey or black on lower throat: 5.

5 Length 6 in.; throat band black or grey-brown, complete; legs yellow: *Charadrius dubius.*
Length 7–9 in.; throat band ochraceous or grey, more or less interrupted in middle; legs grey: 6.

6 Length 7–8 in.; bill shorter than head: *C. mongolus.*
Length 8–9 in.; bill as long as head: *C. leschenaultii.*

***Lobobyx miles* (Boddaert)**

Masked Plover or Lapwing. Length 13 in. Adults: conspicuous yellow wattles on each side of front of head; crown and nape black; hind neck white; back, upper wing-coverts, inner secondaries light brownish grey; upper tail-coverts and basal two-thirds of tail white; terminal third of tail (except very narrow white tip) and outer wing quills black; side of head, neck and underparts white; under wing-coverts white contrasting with black undersurface of wing quills; iris yellow; bill yellow (tip brown); large face wattle yellow; spur on bend of wing yellow; feet pink. Wing 210 mm, tail 80 mm, culmen 38 mm, tarsus 80 mm.

RANGE Northern Australia to Moluccas, Aru Islands, and locally in New Guinea lowlands (Merauke to south-eastern New Guinea and the Ramu and Sepik Rivers). Possibly some northern birds, at least, are migrants from Australia, but the species seems to breed in south New Guinea.

NESTING [In a small hollow in the ground to which a little vegetation

has been added; located in open country or edge of a swamp. Eggs three to five, greenish to yellowish olive spotted and blotched with dark brown of various shades (it has been said that the colour of the egg matches the ground on which it is laid; this needs verification); size 41 × 33 mm. Australian data.]



REMARKS In south New Guinea the masked plover was common at Daru from January to April. Parties of six to twelve birds spent a good deal of time in the cultivated fields and on the lawns about the government station where they were very tame. They sometimes frequented the muddy beaches, and were often seen flying back and forth uttering their loud, not unmusical notes. These birds were rarely seen on the dry savannahs of the Fly River area, but in September when natives burned the grass from the open savannahs about Lake Daviumbo they suddenly became common, frequenting the burned ridges. Flocks of from three to twenty were almost always in sight, and the birds were much wilder than at Daru. Their loud calls as they sprang into flight while forty or more yards from me often startled other birds into flight, interfering with my collecting. Evidently the species nests here for one female was in breeding condition.



In January on the middle Sepik River, the plover was very active on moonlight nights, and was occasionally caught in mist nets set for bats. One such bird, when released, suddenly struck the captor's hands with its sharp wing spurs and inflicted several, deep, painful punctures.

### *Squatarola squatarola* (Linnaeus)

also known as *Charadrius squatarola*

Grey Plover. Black-bellied Plover. Length 11–12 in. The only plover with a rudimentary hind toe. Adult non-breeding plumage: upperparts rather finely patterned or mottled grey, black and white with tail barred brown and white and rump nearly pure white; underparts greyish white except for black axillaries; some individuals may show traces of the black breast of the breeding plumage; iris brown; bill black; feet grey. Wing 180–95 mm, tail 70–84 mm, culmen 27–31 mm, tarsus 41–50 mm.

RANGE Breeds in tundra of Europe, Asia and North America, and during northern winter (austral summer) migrates south to South America, Africa and Australia; in New Guinea recorded at several localities.



REMARKS Apparently not very common in New Guinea, frequents ocean beaches.

### *Pluvialis dominica* (Müller)

American Golden Plover. (Also known as *Charadrius dominica*, and the

Eastern Golden Plover and Pacific Golden Plover.) Length 9–10 in. Adult non-breeding plumage: upperparts including rump and upper tail-coverts dark brown spangled with golden buff; underparts, throat and breast brownish grey, obscurely mottled, abdomen white; axillaries brownish grey like rest of under wing; in breeding plumage with underparts mostly black; iris brown; bill blackish; legs grey. Wing 160–75 mm, tail 58–65 mm, culmen 21–25 mm, tarsus 42–45 mm.

Very like the grey plover but darker and slightly smaller. Note the rump and tail like the back, and the grey not black axillaries of this species.

RANGE Breeds on the tundra of North America and Siberia; winters (in austral summer) in South America and Australia.

SUBSPECIES IN NEW GUINEA One, *fulva* (Gmelin); of Siberia and Alaska; winters (in austral summer) in India, Australia and Pacific islands; common in New Guinea.

REMARKS Singly or in small parties the golden plover feeds on beach and mudflat and on grassy airports; we also found it inland where the Balim River and Wahgi River flow through grasslands at 5,200 ft. On the middle Fly River when the savannah grass was burned by the natives in September, this species appeared in small numbers and fed on the bare ridges.

### *Charadrius dubius* (Scopoli)

Little Ringed Plover. Length 6 in. Adults: forehead white followed by a band of black, edged posteriorly with white; rest of crown and nape, mantle, and back to upper tail-coverts greyish brown; wings and tail darker, the outer tail feathers with much white; hind neck with a white collar joining white of throat, followed by a black band joining black throat band; side of head with a black band from bill to ear-coverts; throat white with a black throat collar; rest of underparts white; iris brown; bill black; base of mandible yellow; feet yellow. Wing 108 (105–119) mm, tail 56 (to 62) mm, culmen 13 (12–15) mm, tarsus 24 mm. Immatures have the black areas of the adult replaced with brown.

RANGE Breeds in Europe, Asia, northern Africa, and also in the New Guinea region; northern birds winter south to Africa, the Malay Archipelago and perhaps New Guinea.

SUBSPECIES IN NEW GUINEA Two:

a) *papuanus* (Mayr); the resident bird of New Guinea and the Bismarck Archipelago; wing 105–8 mm; white line behind black of forehead conspicuous; little or no black in outer tail feathers.

b) *curonicus* (Gmelin); breeds in Europe, northern Africa and central

Asia, east to northern Japan; winters southward to Africa and the Malay Archipelago with one New Guinea record (Japen Island); larger, wing 111–23 mm; white line behind black on forehead obscure or lacking; black bar in outer tail feathers distinct.



NEST [Probably in a little hollow scraped in sand or gravel of beach or river bar. Eggs four(?), creamy to buff, spotted and speckled with dark brown; size 28 × 21 mm. Indian data.]

REMARKS This ringed plover apparently favours gravel bars of rivers, and seems to be uncommon.

**[*Charadrius alexandrinus ruficapillus* (Temminck)**

The Red-capped Dotterel. This bird has been recorded from south New Guinea but as it has not been found in recent years its occurrence needs to be substantiated. It is a small dotterel (length 6 in); upperparts greyish brown; the adult male with crown and nape rusty red, forehead white followed by a black band; a black line from bill to ear-coverts and underparts white with a black and rufous patch on each side of neck. Females lack the red in head. Immatures are like female but with black areas replaced by greyish brown. Bill and feet black; habitat sea coast and lakes.]



**_Charadrius mongolus_ (Pallas)**

Mongolian or Lesser Sand Dotterel. Length 7½–8 in. Adult winter (non-breeding) plumage: upperparts dark or brownish grey with forehead white and outer tail feathers greyish white and upper tail-coverts edged with white; side of head, behind and below eye grey; some rusty wash on neck; underparts white with a grey patch each side of lower throat forming an interrupted throat band; in breeding plumage similar but a black line behind white forehead, side of face black, and interrupted neck band rufous to ochraceous; iris brown; bill black; feet grey. Wing 131–41 mm, tail 52–56 mm, bill 16–18 mm, tarsus 31–35 mm.

RANGE Breeds central and eastern Asia; winters to the south in eastern Africa and Australia.

SUBSPECIES IN NEW GUINEA One, *mongolus* (Pallas); the breeding bird of eastern Asia, goes south in winter (austral summer) to New Guinea and Australia.



REMARKS This migrant from Asia is fairly widespread on ocean beaches and mudflats and locally may be common. At Daru in south New Guinea it was common on the muddy shore, taking refuge from the high tide on mangrove stumps.

***Charadrius leschenaultii* (Lesson)**

Large Sand Dotterel. Length 8–9 in. This is very similar to the preceding species and most easily distinguished from it by the larger size and particularly by the longer bill, which is very evident when the two species are feeding together as they often do. Wing 139–49 mm, tail 52–62 mm, bill 22–27 mm, tarsus 36–39 mm.

RANGE Nests in Asia; winters (in austral summer) in Africa and Australia; in New Guinea area to be expected on any ocean beach or mudflat.

REMARKS This plover was also common on the beach and mudflats at Daru where as many as 400 of them and the lesser sand dotterel, perhaps in equal numbers, were sometimes seen on a March morning. They were by far the commonest shore birds.

***Eupodia asiatica* (Pallas)**

Oriental Dotterel. Length 9–10 in. Adult non-breeding plumage: upperparts including rump generally greyish brown with a buffy wash and some feathers edged with ochraceous; forehead and eyebrow stripe whitish or buffy; underparts whitish with breast sandy buff; tail dark brown with narrow white tip, and lateral pair of quills paler, mostly greyish white; axillaries grey or whitish. In breeding plumage: throat white; breast deep rufous edged posteriorly with black; abdomen white. Iris brown; bill black with base of mandible pale; feet dirty yellow. Wing 166–75 mm, tail 60–65 mm, culmen 22–25 mm, tarsus 47–50 mm.

RANGE Breeds from south-eastern Russia and Persia to Mongolia and northern China; winters (in austral summer) south to eastern Africa and Australia.

SUBSPECIES IN NEW GUINEA One, *vereda* (Gould); breeds in Mongolia and north China, winters in the Sunda Islands and Australia; rare in New Guinea.

REMARKS In Australia this migrant from Asia is often seen in the interior as well as on coastal flats where it arrives in early September and leaves in March.

## Family Scolopacidae *Sandpipers, Curlew,* etc.

*(Eighty species, eighteen in New Guinea)*

Sandpipers and their near relatives form a family of world-wide distribution consisting of about eighty species. Many of them nest in the

Arctic and subarctic and, in the austral summer, winter in the tropics and southern hemisphere where they may form spectacular flocks on beaches and mudflats. In general these birds feed on invertebrates found in the mud, sand or shallow water, but some may frequent grassy plains and feed on insects or berries. The nest is usually on the ground and the down-covered young soon follow the parents. They are usually conspicuous birds found in the open, flying readily from danger with the exceptions of the snipe and woodcocks. Only one species, the woodcock, breeds in New Guinea. The other seventeen species found there are non-breeding migrants.

The many names by which species are known illustrates the interest man has taken in this group, which used to be shot extensively during migration. A brief synopsis of the main types recognized may be of help in recognition:

a) Curlew (*Numenius*); large, brownish birds with moderate to long, down-curved bills: three species; length 14–25 in.; bill $1\frac{3}{8}$–7 in.

b) Godwits (*Limosa*); large, brownish or greyish birds with conspicuous black and white in tails and long bills, straight or slightly upturned: two species; length 14–17 in.; bill $2\frac{1}{2}$–$4\frac{3}{4}$ in.

c) Tattlers (*Tringa*); medium sized to fairly large slender greyish birds with white base of the tail and sometimes on lower back; moderately long, straight, fine bill; neck and legs long: two species recorded; length 8–14 in.; bill 1–$2\frac{1}{4}$ in.

d) Turnstone (*Arenaria*); a stout sandpiper with rather short pointed bill and rather short legs, and a very distinctive pattern of black and white on lower back and tail: one species; length $8\frac{1}{2}$ in.; bill 1 in.

e) Snipe and Woodcock (*Capella* and *Scolopax*); long-billed birds with rather short legs; eyes rather far back and high in side of head (especially woodcock) and plumage coloured in dead-grass (snipe) or dead-leaf-browns: three species; length 10–12 in.; bill $2\frac{1}{2}$–$3\frac{1}{4}$ in.

f) Sandpipers or Stints (*Erolia* and *Limicola*); very small shore birds with moderate bills and legs; plumage above brown or greyish: four species; length $5\frac{1}{2}$–$9\frac{1}{2}$ in.; bill $\frac{3}{4}$–$1\frac{1}{2}$ in.

g) Sanderling (*Crocethia*); a very pale, whitish grey sandpiper without a hind toe: one species; length 7 in.

h) Knots (*Calidris*); rather large sandpipers: two species; length 8–12 in.; bill $1\frac{1}{2}$–$1\frac{3}{4}$ in.

i) Terek Sandpiper (*Xenus*); a large grey sandpiper with a long, upturned bill: one species; length 10 in.; bill $1\frac{3}{4}$–2 in.

j) Common Sandpiper (*Actitis*); a distinctive bird, neither tattler nor sandpiper, with nearly uniform dark brownish upperparts when seen at a distance: one species; length 8 in.; bill 1–$1\frac{1}{4}$ in.

k) Wandering Tattler (*Heteroscelus*); a rather stout tattler with upperparts uniformly dark grey: one species; length 10 in.; bill $1\frac{1}{2}$ in.

**Key to *Scolopacidae* (Sandpipers, Curlew, etc.)**

Note that this key is to birds in non-breeding plumages. Sometimes in the austral autumn just before beginning migration to the north, certain birds may grow some feathers of their breeding plumage which may be quite different from their winter dress. The breeding dress is briefly described under each species, and then the non-breeding plumage in which the New Guinea birds are to be expected is given.

1 Bill 2 in. or more in length: 2.
Bill 2 in. or less in length: 9.

2 Bill decidedly downcurved: 3.
Bill straight or upcurved: 5.

3 Lower back and rump patterned like rest of back: 4.
Lower back and rump white, contrasting with rest of upperparts: *Numenius phaeopus.*

4 Length 20–25 in.: *Numenius madagascariensis.*
Length 14 in.: *Numenius minutus.*

5 Upperparts with distinct brown in pattern: 6.
Upperparts without distinct brown in pattern: 8.

6 Upper tail-coverts barred black and white: *Limosa lapponica.*
Upper tail-coverts patterned buffy, brown and black: 7.

7 Crown black with a longitudinal buffy stripe in centre: *Capella* (two species).
Crown brown with black cross bars: *Scolopax saturata.*

8 Back, rump and tail nearly uniform grey; length 9 in.: *Xenus cinereus.*
Tail black with white bar at base; length 14–17 in.: *Limosa limosa.*
Tail barred; rump and lower back white; length 12–14 in.: *Tringa nebularia.*

9 Lower back white: 10.
Lower back not white: 11.

10 Lower back, rump, and upper tail-coverts white; tail barred: *Tringa stagnata.*
Lower back and upper tail-coverts white with a patch on rump black and tail black: *Arenaria interpres.*

11 With conspicuous white in central upper tail-coverts: 12.
No white in central upper tail-coverts: 15.

12 Tail feathers barred black and white: *Tringa glareola.*
Tail feathers not barred: 13.

13 Length 8 in., bill slightly downcurved: *Erolia testacea.*
Length 9–12 in., bill straight: 14.

14 Upper tail-coverts white with a few spots, breast speckled: *Calidris tenuirostris.*
Upper tail-coverts white barred with black: *Calidris canutus.*

15 Central tail feathers boldly barred: *Numenius minutus.*
Central tail feathers not barred: 16.

16 Upperparts pale grey, whitish in part; toes three: *Crocethia alba.*
Upperparts not so, toes four: 17.

17 Bill 1½ in. or more: 18.
Bill less than 1½ in.: 19.

18 Bill upturned, feet orange: *Xenus cinereus.*
Bill straight, feet dull yellowish: *Heteroscelus incanus.*

19 Back to tail uniform, tail-coverts not black: *Actitis hypoleucos.*
Central tail-coverts and tail feathers black: 20.

20 Length 7½–9½ in.; bill 1–1¼ in.; upperparts with conspicuous brown in pattern: *Erolia acumenata.*
Length 7½ in.; bill 1½ in., and stout and slightly downcurved; back grey and black variegated: *Limicola falcinellus.*
Length 5½–6½ in.; bill ¾ in., slender and straight; back patterned grey and black: *Erolia ruficollis.*

### *Numenius minutus* (Gould)

Little Whimbrel. Length 14 in.; bill 1⅜–2 in., somewhat downcurved. Adults: upperparts variegated black, brown and buffy; a conspicuous eyebrow stripe and line down centre of crown buffy; tail barred black and dark grey; lower throat and breast buffy, finely streaked with brownish black; upper throat and abdomen dull white; iris brown; bill horn brown, base of mandible paler; feet blue-grey. Wing 176–93 mm, tail 70–79 mm, bill 41–49 mm, tarsus 47–53 mm.

RANGE Breeds in Siberia; winters (in austral summer) in the Moluccas-Australian area; very few records in New Guinea.

REMARKS The smallest curlew, and with a small bill.

### *Numenius phaeopus* (Linnaeus)

Whimbrel. Length 16 in.; bill 3–4 in., much curved. Adults: upperparts variegated dark brownish black and pale brownish grey with lower back and rump white barred brown; a conspicuous line over eye and grey line through centre of brown crown; underparts white, more buffy on breast and lower throat which are striped dark brown; flanks sparingly barred; iris brown; bill blackish, brownish towards base and with base of mandible pinkish. Wing 245–60 mm, tail 100–10 mm, bill 77–93 mm, tarsus 55–62 mm.

RANGE Breeds in northern North America, Europe and Asia; winters (in austral summer) southward to South America, Africa and Australia.

SUBSPECIES IN NEW GUINEA One, *variegatus* (Scopoli); the breeding bird of eastern Siberia. Fairly common in austral summer on New Guinea beaches and mudflats.

REMARKS A medium sized curlew with a fairly long bill and a pale line down centre of crown.

***Numenius madagascariensis* (Linnaeus)**

Eastern Curlew. Length 20–25 in., bill up to $7\frac{1}{2}$ in. and downcurved. Adults: upperparts variegated brownish, black and pale greyish brown; rump much like back and no stripe through crown; underparts white, lower throat and breast with fine brown streaks, and flanks with sparse bars; iris brown; bill black, base of mandible pink; feet blue-grey. Wing 295–325 mm, tail 100–22 mm, bill in old females to 190 mm, tarsus 95 mm.

RANGE Breeds in eastern Asia; winters in austral summer southwards to Australia. A few records from the south New Guinea coast.

REMARKS The largest curlew, with a very long curved bill and no pale line through crown.

***Limosa limosa* (Linnaeus)**

Black-tailed Godwit. Length 14–17 in., bill $2\frac{1}{2}$–4 in. and straight or slightly upcurved. Adult non-breeding plumage: upperparts brownish grey with feather edges slightly paler; upper tail-coverts white, central tail quills black, lateral ones black with some white basally; a broad white stripe in wing; underparts grey with abdomen white. In breeding plumage the upperparts are variegated grey, black and ochraceous; underparts white with breast ochraceous and breast and abdomen plentifully barred with dark brown. Iris brown; bill orange yellowish with black tip; feet black. Wing 190–212 mm, tail 79–88 mm, bill 65–99 mm, tarsus 75–93 mm.

RANGE Breeds in northern Europe and Asia; winters in austral summer south to Africa and Australia.

SUBSPECIES IN NEW GUINEA One, *melanuroides* (Gould); the breeding bird of eastern Asia; one New Guinea record.

REMARKS A godwit with white upper tail-coverts contrasting with the black tail.

***Limosa lapponica* (Linnaeus)**

Bar-tailed Godwit. Length 14–15 in., bill 3–$4\frac{3}{4}$ in. and slightly upturned. Adult non-breeding plumage: upperparts variegated black, brown and buffy grey except for upper tail-coverts which are barred brown and white, contrasting but little with the brown and grey or white barred tail; underparts white, washed with grey and faintly streaked on breast. In breeding plumage the underparts are generally rufous. Iris brown;



2 *Melidora macrorhina*, Hook-billed Kingfisher (top); *Clytoceyx rex*, Shovel-billed Kingfisher (centre); *Ailuroedus crassirostris*, Green Catbird (bottom).

bill black, paler towards base; legs black. Wing 225–50 mm, tail 72–85 mm, bill 76–121 mm, tarsus 49–55 mm.

RANGE Breeds in northern Europe and northern Asia to the extreme north-west of North America; winters, in austral summer, south to Africa and Australia.

SUBSPECIES IN NEW GUINEA One, *baueri* (Naumann) (equivalent to *novaezealandiae* of Gray); the breeding bird of eastern Asia and north-western North America; many individual records.

REMARKS The godwit with upper tail-coverts and tail barred.

**[*Tringa stagnatilis* (Bechstein)**

Marsh Sandpiper. Breeds in Europe and Asia and winters, in austral summer, south to Africa and Australia so to be expected in New Guinea, perhaps on fresh water areas. Very like *Tringa nebularia* in pattern but much smaller (length 8 in.) and with a finer bill; feet olive-yellow; wing 135–47 mm, tail 60–63 mm, tarsus 53–60 mm, bill 40–43 mm.]

***Tringa nebularia* (Gunnerus)**

Greenshank. Length 12–14 in., bill 2–2½ in. and slightly uptilted. Adult non-breeding plumage: upperparts variegated predominately black and grey with lower back pure white; upper tail-coverts white with more or less barring; tail barred black and white; underparts white. In breeding plumage the throat and upper breast is streaked with black and there is more black in the back pattern. Iris brown; bill black, slightly upturned; feet grey-green. Wing 180–200 mm, tail 76–82 mm, culmen 52–58 mm, tarsus 58–62 mm.

RANGE Breeds in northern Europe and Asia; winters in austral summer, south to Africa and Australia. There are a few records in New Guinea area.

REMARKS A tall, slender tattler, with lower back and rump white.

***Tringa glareola* (Linnaeus)**

Wood Sandpiper. Length 8½–9½ in.; bill thin, straight, 1–1⅓ in. Adult non-breeding plumage: upperparts dark brownish grey with plentiful white flecking; rump white; tail barred with dark grey-brown and white; eyebrow white; underparts white with grey breast. In breeding plumage lower throat and upper breast streaked with dark brown. Iris brown; bill black; feet olive-green. Wing 124–32 mm, tail 50–56 mm, bill 27–32 mm, tarsus 37–42 mm.

RANGE Breeds in northern Europe and northern Asia; winters in

austral summer south to Africa and Australia. Only a few records from the New Guinea area.

REMARKS A small tattler with a white rump.

### *Xenus cinereus* (Güldenstaedt)

Terek Sandpiper. Length 9 in.; bill long, slender and upcurved, 1¾–2 in. Adult non-breeding plumage: upperparts, rump and upper tail-coverts grey with obscure dark streaks, and with some white in outer tail feathers; white tips to secondaries make a wing stripe in flight; underparts white with a little grey in sides of breast. In breeding plumage black shaft streaks in upperparts more distinct and some streaking on sides of breast. Iris brown; bill black, lighter at base; feet orange. Wing 128–36 mm, tail 50–56 mm, bill 41–51 mm, tarsus 27–30 mm.

RANGE Breeds in northern Europe and northern Asia; winters south in austral summer to Africa and Australia; a few records from the New Guinea area.

REMARKS A grey and white sandpiper with a long, upturned bill and orange-yellow legs.

### *Actitis hypoleucos* (Linnaeus)

also known as *Tringa hypoleucos*

Common Sandpiper. Length 8 in.; bill thin, straight and longer than head, 1–1¼ in. Adult non-breeding plumage: upperparts including rump and upper tail-coverts dark grey with an olive wash and narrow scattered dark bars; a white eyebrow stripe, secondaries with white in central portion giving a wing stripe; outer tail feathers barred dusky and white; underparts white with grey on sides of breast. In breeding plumage the throat and breast are streaked and there are dark shaft streaks on some of the dorsal feathers. Iris brown; bill dark brown; feet grey. Wing 108–18 mm, tail 56–60 mm, bill 25–28 mm, tarsus 25–27 mm.

RANGE Breeds from Europe to eastern Asia; winters in austral summer, south to Africa and Australia.

REMARKS The common sandpiper was not uncommon along the coastal mudflats; and was also found along larger streams and lakes in lowlands and mountains up to altitudes of 10,000 ft. It was the only shore bird found regularly on inland streams, and was often solitary. Its behaviour is rather characteristic: exaggerated tipping of tail and bobbing forepart of body, and a flight with wings held stiffly and low.

***Heteroscelus incanus* (Gmelin)**

Wandering Tattler. Length 10 in.; bill straight and longer than head $1\frac{1}{2}$–$1\frac{2}{3}$ in. Adult non-breeding plumage: upperparts including outer tail feathers nearly uniform dark grey or brownish grey; breast and flanks grey; throat and abdomen white; axillaries dark grey. In breeding plumage the underparts are heavily barred with greyish black. Iris brown; bill dark olive; feet yellowish. Wing 157–68 (and 178) mm, tail 65–75 mm, bill 36–40 mm, tarsus 32–35 mm.

RANGE Breeds in eastern Siberia and Alaska and adjacent territory; winters in austral summer, south to northern South America and Australia.

SUBSPECIES IN NEW GUINEA Two:

a) *brevipes* (Vieillot); breeding in Siberia and migrating commonly to Australia and New Guinea (many localities).
b) *incanus* (Gmelin); the Alaskan bird migrating less commonly to the Australia–New Guinea area (many localities); like *brevipes* but nasal grooves in bill extending two-thirds of the way along the bill (instead of only half way); also somewhat larger, wing to 178 mm.

REMARKS A dark, rather stout tattler-like bird of the sea-shore and edges of protected harbours.

***Arenaria interpres* (Linnaeus)**

Turnstone. Length 8–9 in.; bill slightly shorter than head, tapering to a point and slightly tipped up, length to 1 in. Adult non-breeding plumage: mantle and head variegated blackish brown and buffy or rusty brown; a conspicuous white line in wing in flight; lower back white; V-shaped mark on rump black; upper tail-coverts white, tail black with white tip giving a very distinct pattern in flight; underparts white with a blackish brown more or less white mottled band on breast. Breeding plumage with mantle blotched black and rusty brown, and breast and lower throat solid deep black. Iris brown; bill horn; feet orange. Wing 150–60 mm, tail 63–69 mm, bill 21–24 mm, tarsus 25–29 mm.

RANGE Breeds in the Arctic; winters in austral summer to South America, Africa and Australia.

SUBSPECIES IN NEW GUINEA One, *interpres* (Linnaeus); the breeding bird of northern Europe and Asia.

REMARKS A stout bodied sandpiper-type bird with a very distinct back pattern. The turnstone has been recorded at a number of scattered localities on the Papuan area. The only ones we saw were a flock of

eight sitting on a retaining wall at Samarai, and a dozen sitting on nearby pilings in March.

***Capella megala* (Swinhoe)**

Marsh Snipe. Length 10 in.; bill straight, very long, $2\frac{1}{4}$–$2\frac{3}{4}$ in. Adults: upperparts variegated with black, brown and buff tending towards streaks; the crown black with a longitudinal stripe down centre; central tail feathers black with a broad rufous subterminal band followed by a narrow line of black and a narrow white tip; outer tail feathers grey, black and white; twenty tail feathers (the central ones broad, the outer ones much narrower, the outermost about 2–4 mm wide near tip); iris brown; bill blackish brown, paler basally; feet grey. Wing 133–49 mm, tail 30–60 mm, bill 60–71 mm, tarsus 35 mm.

RANGE Breeds in eastern Asia; winters south in austral summer to northern Australia; a number of records from New Guinea, but not common.

REMARKS Snipe usually frequent marshy places and are rarely seen on the ground. They flush ahead of one, often almost underfoot, and dart away with rapid zigzag flight and harsh calls to drop into the concealment of the marsh. They feed by probing for worms in the soft ground with their long bills.

***Capella hardwickii* (Gray)**

Japanese Snipe. Length 11 in.; bill straight, very long, $2\frac{1}{2}$–3 in. Very like *C. megala* but considerably larger and tail with only eighteen feathers, the outermost not quite as narrow, being 3·5 mm or more wide; also the inner secondaries are shorter in the folded wing, falling short of the wing tip by $\frac{1}{2}$–$1\frac{1}{2}$ in. Wing 153–67 mm, tail 60–68 mm, bill 64–76 mm, tarsus 37 mm.

RANGE Breeds in Japanese Islands; winters, in austral summer, to Australia; two New Guinea records.

REMARKS The first record from New Guinea was of a bird that was flushed from a short grass seepage slope in the alpine country of the Snow Mountains; the second was of two birds taken in the Wahgi Valley in 1951.

***Scolopax saturata* (Horsfield)**

East Indian Woodcock. Length 12 in.; bill long and straight, $3\frac{1}{4}$ in. Adults: upperparts rufous mottled with black which tends towards bars and blotches; crown also rufous with transverse black bars; tail above black with an ashy tip; chin and forepart of face white with a black line from bill to eye; throat, breast, and sides of body rufous

regularly barred across with blackish; centre of breast and abdomen white regularly barred blackish. Wing 154–69 mm, tail 54–59 mm, culmen 74–84 mm, tarsus 35–38 mm.

RANGE Mountains in Sumatra, Java and New Guinea.

SUBSPECIES IN NEW GUINEA One, *rosenbergii* (Schlegel); New Guinea mountains from Arfak to south-eastern New Guinea and Huon Peninsula, from 5,000 to 12,000 ft.

REMARKS The woodcock seems to be a nocturnal forest bird which was more often taken in mammal traps set on the ground than seen otherwise. However, most of those actually seen were flushed from the ground on the edge of the little patches of forest in the alpine grassland, and it was the presence of such patches which seemed to determine the upper altitudinal limit of the species in the Snow Mountains. At dawn and dusk, in August and September in the Owen Stanley Mountains, a number of males were seen singing their flight songs. The birds seemed to cover a regular beat partly over open country, partly over clearings in the forest, and over the forest itself. In horizontal flight the bird every now and then gave a loud, nasal 'queeet', followed by a series of 'quo's', and punctuated and ending with a louder, nasal 'queeet'. The food includes caterpillars and moth pupae judging by two stomach contents.

### [*Calidris canutus* (Linnaeus)

The Knot. This bird breeds in the Arctic and winters in the austral summer south to South America, Africa and (the subspecies *rogersi* [Mathews]) to Australia. Though not recorded in New Guinea, it surely occurs. It is about 9–10 in. long; bill rather short and straight, 1½ in. Adult non-breeding plumage: upperparts grey except for obscure black shaft streaks and pale edgings to some feathers and the conspicuously black and white variegated rump and upper tail-coverts (immatures with more brownish black in back); the tail is nearly plain grey, and the wing has a conspicuous white stripe· underparts white with breast and flanks with irregular narrow blackish bars. In breeding plumage the mantle is variegated black, grey and rusty, the underparts generally rusty red. Iris brown; bill black; feet black. Wing 162–73 mm, tail 60–65 mm, culmen 31–35 mm, tarsus 30–32 mm. A large, stout-bodied, short-legged sandpiper-type bird.]

### *Calidris tenuirostris* (Horsfield)

Great Knot. Length 11–12 in.; bill straight, 1½–1¾ in. Adult non-breeding plumage: upperparts ashy grey with obscure shaft streaks and pale edges to some feathers, upper tail-coverts white sparingly marked with

blackish, and a conspicuous white stripe in wing; tail grey edged and tipped white; underparts white, the fore neck, breast and flanks with small brownish black spots. Breeding plumage: upperparts variegated black, buffy, grey and rusty; upper tail-coverts black and white; underparts heavily marked with conspicuous spots, especially on breast. Iris brown; bill black; feet dark grey to olive. Wing 182–92 mm, tail 70–76 mm, bill 43–49 mm, tarsus 35–37 mm. Immature plumage: similar but back and head variegated black, grey and white.

RANGE Summer spent in north-eastern Siberia; winters, in austral summer, south to Australia; several records from New Guinea.

REMARKS A large, stout-bodied, short-legged sandpiper-type bird.

[***Crocethia alba*** **(Pallas)**
Sanderling. Length 7–7½ in.; bill 1 in., straight and black. The only sandpiper lacking a hind toe. Adult non-breeding plumage: upperparts mostly pale grey; central tail feathers mostly blackish; outer tail feathers and tail-coverts grey and white; wings darker with broad white wing stripe; underparts white. Breeding plumage differs in having upperparts variegated with black, grey-brown, and rufous; throat and sides of breast rufous or rusty obscurely spotted with blackish and mottled with white. Iris brown; bill black; feet black. Wing 117–31 mm, tail 50–54 mm, bill 23–27 mm, tarsus 23–25 mm.

RANGE Breeds in the Arctic; winters south in austral summer to South America, Africa and Australia.

REMARKS A medium small sandpiper found on oceanic sand beaches; with very whitish appearance. Not yet recorded from the Papuan region.]

***Erolia ruficollis*** **(Pallas)**
Little Stint. Length 5½–6½ in.; bill straight, ¾ in., black. Adult non-breeding plumage: upperparts grey with dark centres to some feathers; wing dark with white stripe; central upper tail-coverts and tail feathers blackish, lateral ones mostly greyish white; underside white, the breast scantily spotted with small dusky marks. Iris brown; bill and feet black. Wing 92–102 mm, tail 40–43 mm, bill 16–19 mm, tarsus 20–23 mm. Immatures: underparts unspotted and throat and sides of breast washed pale greyish.

RANGE Breeds in eastern Siberia; winters, in austral summer, south to Australia; a few records from New Guinea.

REMARKS The smallest sandpiper, with greyish upperparts. A common migrant to Australia, often found in flocks on beaches and mudflats.

***Erolia acuminata* (Horsfield)**

Sharp-tailed Sandpiper. Length 7½–9½ in.; bill straight, 1 in., about as long as head, and black. Adult non-breeding plumage: crown rufous streaked with black; mantle variegated black, rich brown and buffy with a tendency to streaking; a narrow white wing stripe; centre of rump, upper tail-coverts and tail feathers blackish with lateral rump and tail-coverts mostly white; a distinct white eyebrow stripe; upper throat and abdomen white, lower throat and breast greyish buff finely streaked on sides. Breeding plumage: underparts white with rusty on lower throat; and throat, breast, and sides of body irregularly barred. Iris brown; bill black; legs olive-green. Wing 125–42 mm, tail 49–61 mm, bill 25 mm, tarsus 30–31 mm.

RANGE Breeds in eastern Asia; winters, in austral summer, south to Australia; a few records for the Papuan region.

REMARKS A medium sized sandpiper, bill only a little longer than head, and upperparts distinctly brownish. In Australia, this is one of the common migrant shore birds found on margins of salt and fresh water.

[***Erolia testacea* (Pallas)**

Curlew Sandpiper. Length 8–8½ in.; bill 1½ in., distinctly longer than head, slightly downcurved and black. Adult non-breeding plumage: upperparts brownish grey; eyebrow stripe white; wing quills blackish; distinct white wing stripe; upper tail-coverts white contrasting with grey tail and rump; underparts white, sometimes faintly dusky on throat. Breeding plumage: upperparts variegated black, red-brown and greyish buff; underparts mostly dark reddish brown. Iris brown; bill and feet black. Wing 126–37 mm, tail 48–52 mm, bill 33–42 mm, tarsus 29–31 mm.

RANGE Breeds in northern Asia; winters, in austral summer, south to Africa and Australia. In Australia, this is one of the common migrant shore birds, but it has not yet been recorded in the Papuan region where it surely occurs.

REMARKS A medium sized sandpiper with brownish grey back, rather long, downcurved bill and a white patch on base of tail.]

***Limicola falcinellus* (Pontoppidan)**

Broad-billed Sandpiper. Length 7½ in.; bill 1¼ in., somewhat longer than head, black, and slightly curved, and broad when seen from above. Adult non-breeding plumage: upperparts brownish grey, feathers with darker centres; rump and tail black with whitish sides; small white wing stripe; eyebrow stripe white; underparts white, the lower throat and breast streaked dusky. Young birds have a buffy tinge on breast.

Breeding plumage: upperparts variegated black, brown and grey; underparts white with breast heavily spotted brownish black. Iris brown; bill black; feet grey-green to black. Wing 105–10 mm, tail 38–40 mm, bill 29–33 mm, tarsus 31–34 mm.

RANGE Breeds in northern Europe and Asia; winters south, in austral summer, to the Mediterranean, India and Australia. One record from New Guinea is of the East Siberia race, *L. f. siberica* (Dresser).

REMARKS A fairly small brownish grey backed sandpiper, without white bar at base of tail and with speckled throat.

## Family Recurvirostridae *Stilts* and *Avocets*

*(Seven species, one in New Guinea)*

A small family of wide distribution in the warmer parts of the world. There are only seven species of which one, a stilt, occurs in New Guinea. The members of this family feed on small water animals, insects, crustaceans, fishes, etc. The nest is made on the ground and the down-covered young are active from hatching.

### *Himantopus himantopus* (Linnaeus)

White-headed Stilt. Length 14–15 in. The three front toes are partly webbed and the hind toe is lacking. Adults: mantle including wings glossy black; central portion of hind neck also black; plumage otherwise white; iris pink and red; bill black; legs pink. Wing 220–45 mm, tail 60–75 mm, bill 59–64 mm, tarsus 103–12 mm. The immature birds have the black duller and browner and the white of the head washed with grey.

RANGE In the warmer parts of all continents and in the Indo-Australian islands.

SUBSPECIES IN NEW GUINEA One, *leucocephalus* (Gould); that ranges from Australia to Java, the Philippines and Bismarck Archipelago; in New Guinea recorded at several localities.

NESTING [In a hollow in the ground, near water or in a nest of vegetation in shallow water; eggs four, olive blotched and spotted with dark brown; size 44 × 31 mm. Australian data.]

REMARKS This tall, slender black and white bird is most distinctive and conspicuous. In Australia it is said to be a bird characteristic of grassy swamps, lake shores and estuaries, and is somewhat gregarious. However, it is evidently rare in most of New Guinea, for in our work in the extensive marshes of the Fly River we did not find it, and we saw

only a single bird in north New Guinea, on a sand-bar of the Idenburg River. However, Gyldenstolpe records the species as very common on Aimaroe Lake, in western Vogelkop, where flocks of up to 100 individuals were seen.

## Family Phalaropodidae *Phalaropes*

*(Three species, one in New Guinea)*
There are only three species of Phalaropes, all north temperate or arctic nesters, which winter in tropical or subtropical oceans on which they swim and rest, usually in big flocks. One species has been recorded in New Guinea. The Phalaropes, which nest like sandpipers, are notable in that the breeding female is brighter as well as larger than the male and takes the active part in courtship, while the male cares for the eggs and young.

### *Lobipes lobatus* (Linnaeus)
also known as *Phalaropus lobatus*

Northern or Red-necked Phalarope. Length 6½–7 in.; bill fine, toes webbed at base, with scalloped lobes terminally. Adult non-breeding plumage: upperparts grey more or less variegated with white; immatures more blackish and with buff edges to some feathers; tips of greater wing-coverts and part of secondaries white giving a conspicuous wing stripe; a dark mark through eye; some adults with a trace of rufous in side of neck; rest of underparts white. Female breeding plumage: slaty grey to black, some feathers of back and scapulars margined ochraceous buff; throat white; sides and front of neck rufous followed by slaty grey; lower breast and abdomen white. Male duller with rufous more dusky or mixed with fuscous. Iris brown; bill black; feet black. Wing 110 mm, tail 45 mm, bill 23 mm, tarsus 21 mm. Immatures like non-breeding adults but upperparts darker.

RANGE Breeds in the Arctic and subarctic; winters, in austral summer, at sea in warmer waters; common off northern New Guinea.

REMARKS This is a swimming snipe that spends the non-breeding season at sea in flocks, feeding on surface-living crustaceans.

## Family Burhinidae *Thick-knees* or *Stonecurlew*

*(Nine species, one in New Guinea)*
This family lives in the warmer parts of both hemispheres and is a small one of only nine species, one of which occurs in the New Guinea area.

The food of these birds includes a wide variety of small animals from worms and insects to mice and frogs. The nest is on the ground and the young may stay in or near the nest for some time.

### *Esacus magnirostris* (Vieillot)

Beach Stonecurlew. Length 20–22 in. Three front toes; hind toe lacking; bill longer than head; very stout. Adults: upperparts generally grey or grey-brown; lesser upper wing-coverts dark brown followed by a white bar; rest of wing-coverts and inner secondaries pale grey, greyer than back; outer secondaries and primaries with conspicuous black and white; lateral tail feathers grey-brown with large subterminal white marks and black tips; side of head black with white line from over eye to nape, white mark below eye, and white line along base of upper mandible to join white of throat; middle and lower neck grey finely streaked brown; breast grey; abdomen buffy white; iris yellow; bill black; legs greenish. Wing 280 mm, tail 125 mm, bill 76 mm, tarsus 85 mm.

RANGE Malay Peninsula to Solomon Islands and Australian areas; in the New Guinea region recorded on many islands and localities on mainland.

NESTING [A single egg laid on the beach, without nest material; egg buffy, heavily marked with blotches of brown and sometimes hair-like lines; size 63 × 45 mm. Australian data.]

REMARKS This bird seems to be a bird of reefs and sandy beaches.

## Family Glareolidae *Pratincoles*

*(Seventeen species, two in New Guinea)*

This is a small family of some seventeen species with a range in the warmer parts of the Old World, living on open ground often near water. They are strange birds similar in some ways to both plovers and terns. They feed on insects and other small animals, caught on the ground or in flight. Eggs are laid on the ground in the open and the down-covered young usually stay in the nest for a time at least. Two species occur in the New Guinea area.

### Key to *Glareolidae* Species

Tail nearly square, no black line across throat: *Stiltia isabella.*
Tail deeply forked, a black line across throat and to eye: *Glareola maldivarum.*

***Stiltia isabella* (Vieillot)**

Australian Pratincole. Length 8 in. Bill shorter than head; gape broad; tail short and square; wing tip very long, outer primary much the longest and extending 2½ in. beyond tip of tail when wing folded. Adults: upperparts generally olive or grey-brown, the feathers all edged with bright rusty brown except for outer wing feathers which are black, and tail which is white with central quills with broad black subterminal bar and narrow white tip; throat and breast buffy ochraceous; sides of body with large chestnut patch; abdomen and under tail-coverts buffy white; iris brown; bill, base red, tip black; legs black. Wing 198 mm, tail 60 mm, bill 15 mm, tarsus 50 mm. Immatures have broad buffy edgings to feathers of underparts.

RANGE Breeds in Australia (and south New Guinea?); migrates northward in austral winter as far as Java, Borneo, and north New Guinea.

NESTING [A depression in the soil; eggs two, pale grey marked with brown and grey all over; size 33 × 24 mm. Australian data.]

REMARKS In Australia this pratincole is recorded as a bird characteristic of open country where it runs rapidly in quest of insect food, or captures it during flight. This is light, buoyant and with many zigzag changes of course. The exceptionally long wing is very evident in flight, and the birds are said to gather in flocks to migrate.

***Glareola maldivarum* (Forster)**

Oriental Pratincole. Length 9–10 in.; bill short, gape wide; wings long and pointed reaching end of deeply forked tail; legs moderately short for a shore bird. Adults: upperparts olive-brown with hind neck tinged rufous, wing quills black, upper tail-coverts white and tail feathers white with black tips; throat ochraceous with a line of white followed by a line of black enclosing it and meeting eyes whence the black line continues to lores; breast grey tinged rufous changing posteriorly to ochraceous and then white on abdomen and under tail-coverts; under wing-coverts and axillaries chestnut; iris brown; bill black, gape red; legs brownish black. Wing 191 mm, tail 82 mm, bill 16 mm, tarsus 35 mm. The young bird is dark brown, speckled buffy above; underparts whitish with a speckled throat band.

RANGE Breeds in eastern and southern Asia; wintering in austral summer to Australia. One New Guinea record.

REMARKS These are rather short-legged, very long-winged shore birds which generally feed on the wing, like swallows or swifts. They fly over open country, perch on open ground and are often seen in flocks.

## Family Laridae *Gulls* and *Terns*

*(Eighty-four species, fifteen in New Guinea)*
This family of about eighty-four species is of nearly world-wide distribution. The New Guinea representatives are best discussed under their respective subfamilies.

### Key to Subfamilies

Bill stout and hooked at tip; tail nearly square; adult plumage grey and white with outer wing quills black with conspicuous white spots near tips (one species): Subfamily *Larinae*.

Bill more slender and tapering to point; tail square, forked or wedge-shaped; adult plumage varies from white to mostly grey and white with black on head, to blackish above, white below, to mostly dusky; wing quills without white subterminal spots (fourteen species in New Guinea): Subfamily *Sterninae*.

### Subfamily *Larinae* Gulls

*(Forty-four species, one in New Guinea)*
There are some forty-four species of gulls, most of which live in northern coastal waters or lakes, but about one-quarter live in southern waters and only a few in the tropics where terns seem to replace them. There is but a single record of one species, the silver gull, for the New Guinea area, presumably a stray from Australia.

#### *Larus novaehollandiae* (Stephens)

Silver Gull. Length 16–17 in. Adults: head and neck all round, whole underparts and tail, white; mantle grey, two or three outer primaries black with a large white spot near tip, other primaries white with black terminal or subterminal black band; iris white with red eyelid; bill and feet red. Wing 223–300 mm, tail 108–12 mm, bill 43 mm, tarsus 43–50 mm. Young similar to adult but mantle mottled brown; first two primaries brownish black; tail with a blackish brown subterminal band; bill brownish; feet greyish.

RANGE South Africa, coastal Australia, New Zealand and some adjacent islands; one New Guinea record at Daru Island, south New Guinea; probably of the Australian subspecies *forsteri* (Mathews).

### Subfamily *Sterninae* Terns

*(Forty species, fourteen in New Guinea)*
The terns comprise some forty species. While the group is of nearly world-wide distribution, it is predominately found in the warmer parts of the globe. Fourteen species have been recorded in the New Guinea

area. Three of these are commonly found on fresh water but the others are more typical of ocean beaches, islets and coastal waters. These are common birds, often seen in flocks. They like to perch on the beach, on rocks or pilings at the water's edge, or even on floating objects. When feeding, they fly over the water with graceful, swallow-like movements and plunge head first on their prey of fish; they may also pick food, such as insects, daintily from the surface. Most species nest on the ground; a few in trees. Nests are often in great colonies, often on little islands. Young terns hatch covered with mottled down and can soon walk a little, but they are dependent upon the adult bird to bring them food until they are able to fly.

Little attention has been paid to terns in New Guinea waters, most naturalists ignoring these wide-ranging species in favour of the more strictly Papuan land birds.

**Key to Terns**

Note that in some species the non-breeding dress is different from the breeding plumage, sometimes very different. Young birds may have blotches or bars of dusky or buffy colouring on the upperparts or they may be extensively brownish. The young birds are not keyed out.

1 Plumage generally uniform blackish or greyish brown except for pale crown: (*Anous*) 2.
Not so: 3.

2 (a) Crown pale grey shading to white on forehead: *Anous stolidus.*
(b) Crown and forehead white: *Anous minutus.*

3 Head and neck all round, back and breast black; wings grey and white: *Chlidonias leucoptera.*
Not so: 4.

4 Top of head black; rest of upperparts black or uniform greyish brown: 5.
Not so: 6.

5 (a) Back black; underparts white; forehead broadly white with a white stripe reaching only to over eye: *Sterna fuscata.*
(b) Back dark greyish brown; underparts white; abdomen tinged grey; forehead narrowly white with white stripe reaching behind eye: *Sterna anaethetus.*

6 Crown and nape black or black and white; back grey: 7.
Plumage entirely white: *Gygis alba.*

7 Bill wholly or mostly yellow or orange, neither red nor black, and forehead white: 8.
Not so: 9.

8 (a) Large, length 18 in.; shaggy black crest on nape; bill wholly greenish yellow: *Sterna bergii.*

(b) Medium, length 15 in.; shaggy black crest on nape; bill wholly orange: *Sterna bengalensis.*

(c) Small, length 10 in.; no crest; bill yellow-orange (tip sometimes black): *Sterna albifrons.*

9 Whole top of head black: 10.
Forehead at least and sometimes part or whole of crown white; nape at least with black: 12.

10 (a) Bill all red; tail with only slight fork and grey like back; abdomen slaty: *Chlidonias hybrida.*

(b) Bill red at base, black at tip; tail white, deeply forked; underparts white: *Sterna dougallii.*

(c) Bill all black: 11.

11 (a) Rump and tail mostly white, tail deeply forked, outer tail feathers edged grey; bill slender: *Sterna hirundo.*

(b) Rump and tail mostly grey, tail moderately forked, outer tail feathers edged white; bill stout: *Gelochelidon nilotica.*

12 Forehead and fore crown more or less white, hind crown and nape more or less black; back grey; underparts white.

(a) *Sterna fuscata*; length 12–13 in.; forehead and crown white with a clear-cut black bar on nape and band to eye; back very pale grey; tail deeply forked and white.

(A number of non-breeding plumages of other species need to be distinguished here – best done by diagnosis.)

(b) *Chlidonias leucoptera*; length 9–10 in.; tail very little forked, nearly square and grey like back but rump paler; white collar on hind neck behind black patch on nape; white underparts may be mottled with black feathers of breeding plumage.

(c) *C. hybrida*; length 11–13 in.; very like *C. leucoptera* but rump not paler, white collar on hind neck less evident, and size smaller, especially bill.

(d) *Gelochelidon nilotica*; length 15 in.; tail moderately forked and grey like back but outer webs of outer feathers whitish; bill stout; hind crown and nape streaked black and white.

(e) *Sterna hirundo*; length 14 in.; tail deeply forked, white, with outer web of outer streamers grey; forecrown mostly white, hind crown mostly black; younger birds may have dark 'shoulders'.

(f) *Sterna dougallii*; length 16 in.; very like *S. hirundo* but tail more deeply forked and outer web of outer tail feathers white.

(g) *Sterna albifrons*; length 10 in.; the well forked tail and small size of this little tern is distinctive.

***Chlidonias leucoptera* (Temminck)**

White-winged Black Tern. Length 9–10 in. Tail short, slightly forked.

Adult breeding plumage: whole head and neck, upper back and underparts of body, axillaries and under wing-coverts black; smaller upper wing-coverts white, rest grey; wing quills dark; rump and tail white; iris brown; bill blackish red; feet yellowish red. Wing 204–21 mm, tail 70–75 mm, bill 23–27 mm, tarsus 19–21 mm. Non-breeding plumage: very like the marsh tern in similar plumage, but bill always shorter; rump paler than back, and white hind neck is more evident; young birds may have upperparts mottled brown and tail is also grey.

RANGE Breeds in south-eastern Europe and central Asia east to Amurland and northern Mongolia; winters south, in austral summer, to Africa and Australia. Recorded once from waters of south New Guinea.

REMARKS On 21 April 1936, this species was fairly common about a reef twelve miles off Daru. The birds occur in large numbers in Australia in some years, and then they may occur on fresh water marshes and lakes. Birds in breeding plumage are rare there.

***Chlidonias hybrida* (Pallas)**

Marsh Tern or Whiskered Tern. Length 11–13 in. Tail short, slightly forked. Adult breeding plumage: crown to eye level and to bill black; rest of upperparts bluish grey, darker on the mantle and paler on tail feathers, the outer pair of which have the greater part of the outer web whitish; wing quills dark grey with white inner edge and grey on outer margins; side of head below eye white and upper throat whitish shading to slaty black on rest of underparts; under wing-coverts white, axillaries blue-grey; iris brown; bill dark red; feet lighter red. Wing 213–36 mm, tail 83 mm, bill 27 mm, tarsus 22 mm. Non-breeding plumage differs in the underparts being white, forehead white, crown streaked black and white; a black line through eye; bill dusky. Young birds may have dusky mottling on the back.

RANGE Breeds in southern Europe, Africa, southern Asia to Australia.

SUBSPECIES IN NEW GUINEA One, *fluviatilis* (Gould); that also ranges from the Moluccas to Australia, and has been recorded on rivers and lakes of north and south New Guinea.

NESTING [In fresh water swamp; nest of water-weed on swampy ground, often in colonies; eggs three, greyish or brownish olive blotched and spotted with dark brown and grey; size 37 × 28 mm. Australian data.]

REMARKS In August and September the marsh tern was not uncommon on the lagoons of the middle Fly River. It fed over the weedy stretches of water, usually in parties of three to eight. The birds beat upwind, twenty or so feet up and dived on their prey of fish (one stomach

examined); when the end of the area had been reached the birds swept downwind and began again. Birds perched to rest on the seed stalks of lotus lilies. Only about one bird in fifteen was in breeding plumage.

***Gelochelidon nilotica* (Gmelin)**

Gull-billed Tern. Length 15 in.; tail moderately forked; bill stout for a tern but still pointed; legs rather longer than in most terns. Adult breeding plumage: forehead, crown to level of eye and nape black; mantle pale grey shading to white on tail; underparts white; iris brown; bill black; legs black. Wing 343 mm, tail 141 (fork 36–48) mm, bill 45 mm, tarsus 36 mm. Non-breeding plumage: similar but forehead white; rest of top of head and nape streaked with black and a black patch around eye to ear-coverts.

RANGE Breeds locally in North and South America, northern Africa, Europe, Asia and Australia; northern birds winter southward.

SUBSPECIES IN NEW GUINEA Two:

a) *macrotarsus* (Gould); the Australian one which visits the south New Guinea coast.
b) *affinis* (Horsfield); like *macrotarsus* but smaller, wing 255–70 mm; Lake Sentani in north New Guinea (recorded by Ripley).

NESTING [In depression in ground, on islands in lakes or swamps; no nest material added; eggs two or three, light brown to olive blotched and spotted with dark brown; size 54 × 37 mm. Australian data.]

REMARKS In Australia this is a fresh-water marsh tern, but it also visits estuaries and sea coasts.

***Sterna hirundo* (Linnaeus)**

Common Tern. Length 14 in.; tail deeply forked. Adult breeding plumage: forehead, crown to eyes and nape black; mantle grey; rump to tail white, lateral tail feathers with grey outer webs; underparts white with grey wash on breast; iris brown; bill black (Siberian race); feet red. Wing 270 mm, tail 160 (fork 80) mm, bill 37 mm, tarsus 20 mm. Non-breeding plumage: similar but forehead and forecrown white. Young birds have 'shoulder' darker and blackish.

RANGE Breeds in North America, northern Africa, Europe, and northern Asia; wintering southward to South America, Africa and New Guinea.

SUBSPECIES IN NEW GUINEA One, *longipennis* (Nordmann); characteristic of eastern Siberia; which winters in the Moluccas, the Aru Islands and the New Guinea–Solomon Island area.

***Sterna dougallii* (Montagu)**

Roseate Tern. Length 15 in.; tail very deeply forked. Adult breeding plumage: very like common tern but outer tail feathers white with longer 'streamers' (outer tail feathers); pure white or rose-tinged breast and partly red bill; iris brown; bill red at base (breeding), black at tip; legs red. Wing 230 mm, tail 185 (fork 120) mm, bill 37 mm, tarsus 20 mm. Non-breeding plumage: similar but with white in forehead and forecrown, nape black. Young birds have blackish spots or bars on back and grey outer tail feathers.

RANGE Breeds locally in North America, northern Africa, Europe, southern Asia and certain islands to Australia; northern birds winter southward.

SUBSPECIES IN NEW GUINEA One, *bangsi* (Mathews); breeding in isolated colonies from islands off China coast to D'Entrecasteaux Archipelago, Solomon Islands and New Caledonia. (Does the race *gracilis* (Gould) of Australia occur in south New Guinea?); recorded several localities in New Guinea area.

NESTING [On ground; eggs one, rarely two, grey with spots and blotches of brown and grey; size 41 × 29 mm; sometimes nests in large colonies on islands. Australian data.]

***Sterna sumatrana* (Raffles)**

Black-naped Tern. Length 12–13 in.; tail very long and very deeply forked. Adults: white with a very pale grey mantle (appearing white at a distance), and a black band through eye to black bar on nape; iris brown; bill black with or without yellowish tip; feet black. Wing 212 mm, tail 150 mm, bill 37 mm, tarsus 18 mm. Young birds have many dark and buffy markings in the upperparts.

RANGE Tropical Indian and Pacific oceans breeding on small islands; south to northern Australia; subspecies *sumatrana* (Raffles), in New Guinea area and from Australia to China.

NESTING [In a depression in the sand; eggs two, buff, blotched and spotted with brown and grey; size 40 × 29 mm. Australian data.]

***Sterna anaethetus* (Scopoli)**

Brown-winged Tern or Bridled Tern. Length 15 in. Very like the sooty tern but slightly smaller; upperparts paler more greyish brown with a black cap; white on forehead narrower and extends back past eye as a short eyebrow stripe (instead of being wider and just reaching eye), and underparts more grey tinged. Young birds are whitish below and with white mixed in crown and back.

RANGE Tropical and subtropical seas. Reported from a number of localities in the Papuan region – subspecies *anaethetus* (Scopoli); which ranges from Ceylon and Japan to Australia.

NESTING [On ground, sometimes sheltered in crevices of rocks; a single egg, grey spotted with chestnut or brown and grey; size 44 × 32 mm. Australian data.]

REMARKS A coastal bird sometimes seen well out to sea.

***Sterna fuscata* (Linnaeus)**

Sooty Tern. Length 17 in.; tail very deeply forked. Adults: forehead white; line from bill to eye, crown and nape black; rest of upperparts brownish black except for outer web of very long outer tail feathers which are white; underparts white, becoming tinged grey posteriorly; iris brown; bill blackish; feet blackish. Wing 285 mm, tail 180 mm, bill 44 mm, tarsus 25 mm. Immatures: upperparts sooty brown, some feathers with white tips; underparts brown, paler on abdomen.

RANGE Tropical and subtropical seas.

SUBSPECIES IN NEW GUINEA One, *serrata* (Wagler); coasts of Australia, New Guinea, Moluccas to Solomons and New Caledonia.

NESTING [Sometimes breeds in large colonies; nests on ground under a bush or in open; a single egg, grey spotted with brown; size 54 × 36 mm. Australian data.]

***Sterna albifrons* (Pallas)**

Little Tern or Least Tern. Length 10 in.; tail moderately forked. Adult breeding plumage: forehead white; line bill to eye, mid and hind crown and nape black; mantle grey; tail white; underparts white faintly grey-tinged posteriorly; iris brown; bill yellow or orange with or without black tip; legs yellow-orange. Wing 165 mm, tail 100 mm, bill 25 mm, tarsus 15 mm. Non-breeding plumage: similar but more white on forecrown. Immatures: like adults but crown buffy white with black streaks; upperparts grey and brownish, mottled; bill brown; feet yellowish.

RANGE Breeds in North America, Africa, Europe, Asia and Australia; northern birds winter southward. In New Guinea reported on both north and south coasts, and on larger rivers; subspecies *sinensis* (Gmelin); which ranges from Japan and China to Australia.

NESTING [In a depression in the sand in the open; eggs two, spotted with brown and grey; size 33 × 26 mm. Australian data.]

REMARKS The little tern was fairly common on the lagoons of the

Idenburg River in April, flying over the water, and feeding in flocks of ten to fifteen individuals. They were evidently nesting nearby as several specimens were in breeding condition. In south New Guinea a hundred or more birds were sometimes found perched on exposed reefs.

***Sterna bergii* (Lichtenstein)**
also known as *Thalasseus bergii*
Greater Crested Tern. Length 18 in.; tail well forked; a shaggy crest on nape. Adult breeding plumage: forehead white; crown, nape and crest black; rest of upperparts grey; underparts white; iris brown; bill greenish yellow; feet brownish black. Wing 350 mm, tail 180 mm, bill 63 mm, tarsus 31 mm. Non-breeding plumage: similar but crown mainly white, nape black. Immatures: similar but top of head streaked black and white and back mottled black and buff.

RANGE Coasts of Indian Ocean and western Pacific; recorded throughout Papuan region, subspecies *cristatus* (Stephens); ranging from Malay Peninsula and Riukiu Islands to Australia and western Pacific.

NESTING [In a depression in the sand; a single egg, grey with brown and grey spots and streaks; size 61 × 42 mm. Australian data.]

***Sterna bengalensis* (Lesson)**
also known as *Thalasseus bengalensis*
Lesser Crested Tern. Length 15 in. Very like the greater crested tern but smaller; bill orange (not greenish yellow).

RANGE Red Sea and Mediterranean, and Indian Ocean to northern Australia; in New Guinea on south coast and Aru Islands, the subspecies *torresii* (Gould), of Malay Archipelago to Australia.

NESTING [A depression in sand or coral; a single egg, grey, blotched and spotted with dark brown and grey; size 54 × 36 mm. Australian data.]

***Anous stolidus* (Linnaeus)**
Common Noddy. Length 16 in.; outer tail feathers shortest, but central pair slightly shorter than next. Adult plumage generally grey-brown above and below, with forehead whitish shading into grey on crown and brown on hind neck; iris brown; bill black; feet black. Wing 268 mm, tail 162 mm, bill 48 mm, tarsus 25 mm. Immatures: similar to adult but somewhat paler, crown less greyish; a white line above eye.

RANGE Tropical and subtropical seas. In New Guinea coastal waters fairly common; subspecies *pileatus* (Scopoli), of the Indian and western Pacific Oceans.

NEST [A substantial structure of vegetation placed on the ground or in

the top of a thick bush; a single egg, dull white or grey, spotted brown and purplish; size 55 × 37 mm. Australian data.]

***Anous minutus* (Boie)**

White-capped Noddy. Length 12–13 in. Very like the common noddy but smaller, plumage generally darker and blacker, and cap paler and whiter, contrasting more sharply with the rest of the plumage. Wing 230 mm, tail 120 mm, bill 45 mm, tarsus 17 mm. Immatures similar.

RANGE Tropical Atlantic and Pacific Oceans; in New Guinea one subspecies, *minutus*, which ranges from New Guinea and Queensland to the Turamotu group.

NESTING [In a tree or bush, a substantial nest of vegetation; a single egg, whitish spotted with brown; size 46 × 32 mm. Australian data.]

***Gygis alba* (Sparrman)**

White Tern. Length 11–13 in.; tail with both outer and central tail feathers shorter than others. Adult plumage pure white except for narrow black ring around eye; iris brown; bill black; feet black, webs yellowish. Wing 230 mm, tail 104 mm, bill 40 mm, tarsus 12 mm. Immatures: similar but with a black spot behind eye, black shafts to wing and tail quills, brownish tips to some back feathers.

RANGE Tropical oceans; one record from New Guinea area, subspecies *candida* (Gmelin), which ranges from Micronesia to western Polynesia.

NESTING [Eggs laid on a flat place on branch of a tree or on bare rock, no nest made; a single egg, grey, spotted; size 43 × 33 mm. Australian data.]

REMARKS This species has been called fairy tern, a name used in Australia for another species, *Sterna nereis*.

# Order 11 Columbiformes

## Pigeons, Doves, etc.

*Three families, one in New Guinea*

This order includes the sand grouse, family Pteroclidae, which are partridge-like birds found in open country, desert and steppeland, of Europe, Asia, and Africa. The extinct, giant flightless dodo and its relatives (family Raphidae) of Mauritius and nearby islands east of Madagascar; and the pigeons and doves (family Columbidae) widespread in the warmer parts of the world, are all classified here.

### Family Columbidae *Pigeons* and *Doves*

*(300 species, forty-four in New Guinea)*

The pigeons and doves number some 300 species and the New Guinea–Australia area is particularly rich in types of pigeons as well as in numbers of species.

In New Guinea there are forty-four species that range from five to thirty-one inches in length. Most are forest tree birds, with short legs and often much green colouring, often splashed with patches of bright colours. Some individuals are ground birds found on the forest floor, with relatively long legs and dull coloration; and two species feed on the ground in open country. The birds' food is usually fruit, which is swallowed whole; though a few eat seeds. The standard pigeon pattern of nesting is in a tree with one or two white eggs, though a few species do nest on the ground. Incubation is undertaken by the female except during the midday hours when the male incubates. The young stay in the nest and are fed by regurgitation; at first, on a crop secretion called pigeon's milk.

Some pigeons fly in flocks and are conspicuous, and some gather in numbers to feed in fruit trees, but others feed on the ground and are solitary and shy.

### Key to Pigeon Genera

1 Very large, length 23–29 in.; with long, filmy crest (figure 27): *Goura.*
Not so: 2.

2 Length 12 in.; very short white tail, plumage dark with glossy hackles: *Caloenas.*
Not so: 3.

3 Length 17–19 in.; mantle maroon-red to chestnut, underparts wholly blackish: *Otidiphaps.*
Not so: 4.

4 Length 12–14 in.; plumage generally dark except for brown to buffy abdomen contrasting with slaty breast: *Trugon.*
Not so: 5.

5 Length 14–17 in.; plumage dark except for grey to white forecrown; bill long: *Henicophaps.*
Not so: 6.

6 Tail fairly long to long, feathers graduated: 7.
Tail moderate, not graduated though sometimes rounded: 9.

7 Length 7–11 in.; white tips to outer tail feathers: *Geopelia.*
No white tips to outer tail feathers: 8.

8 Length 19–21 in.; mantle and tail red-brown, head and underparts grey to whitish: *Reinwardtoena.*
Length 11–15 in.; plumage generally brownish, sometimes underparts pinkish buff: *Macropygia.*

9 Small, 5–12 in.; with much vivid, non-iridescent green in plumage and often patches of other vivid colours: *Ptilinopus, Megaloprepia.*
Small, 7–10 in.; mostly dark coloured, if with green it is iridescent and on upperparts only: *Gallicolumba, Chalcophaps.*
Large, 13–16 in.; colour various, if with green it is on mantle and iridescent; no red in plumage: *Ducula, Gymnophaps, Columba.*

### Key to *Ptilinopus* and *Megaloprepia* Species

1 Underparts chiefly maroon-red: *Megaloprepia magnifica.*
Not so: 2.

2 A vivid white (sometimes with yellow) bar on upper breast: 3.
Not so: 5.

3 Crown entirely green: *Ptilinopus solomonensis* (male).
Not so: 4.

4 Forecrown red: *Ptilinopus rivoli* (male).
Entire crown red: *Ptilinopus wallacii* (male), (female).

5 Forecrown red, orange, yellow, purple, or lavender: 6.
Crown green or greenish yellow: 8.

6 Hind collar and sides of neck brick-red: *Ptilinopus superbus* (male).

Hind collar, neck and upper breast blue-grey: *Ptilinopus aurantiifrons* (male), (female).
Not as above: 7.

7 Forecrown vinaceous red, lower breast orange to yellow without red: *Ptilinopus regina* (male), (female).
Forecrown vinaceous red, lower breast chiefly orange to yellow with a red bar: *Ptilinopus pulchellus* (male), (female).
Forecrown pale lavender to pale vinaceous purple edged with yellow: *Ptilinopus coronulatus* (male), (female).

8 Length 6 in. or less: *Ptilinopus nanus* (male), (female).
Length 7 in. or more: 9.

9 Breast uniform green, abdomen uniform orange: *Ptilinopus izonus* (male), (female).
Not so: 10.

10 Upper breast with a patch of red: *Ptilinopus viridis* (male).
Upper breast mustard or olive-brown to dark brown: 11.
Upper breast uniform green: 12.

11 Lesser wing-coverts with blood-red patch: *Ptilinopus ornatus* (male), (female).
Wing-coverts green with large pinkish or reddish spots: *Ptilinopus perlatus* (male), (female).

12 Length more than 9 in.: *Ptilinopus rivoli* (female).
Length less than 8½ in.: 13.

13 Abdomen and under tail-coverts largely whitish, nape patch blackish blue: *Ptilinopus superbus* (female).
Under tail-coverts uniform yellow: *Ptilinopus solomonensis* (female).
Under tail-coverts pale yellow streaked with green: *Ptilinopus viridis* (female).

***Ptilinopus regina* (Swainson)**

Swainson's Fruit Dove. Length 8–9 in. Adult male: upperparts yellowish green; crown rich vinaceous purple narrowly edged with buff to yellow; side of head yellowish green to grey; wing quills blackish to yellowish green on exposed edges, with some of the coverts and secondaries edged with pale yellow; tail quills above generally dusky to green on exposed edges and with broad yellow tips, in which unique; throat greyish washed with yellow; sides of throat, neck and upper breast grey to apple-green; mid-breast rich brick-orange washed with pinkish purple at midline; rest of underparts pale yellow and green; under wing surfaces generally grey, the coverts with some green; iris amber; bill green; feet grey; wing 129–35 mm, tail 78 mm, exposed culmen 13 mm, tarsus 17 mm. Female like male but neck more greenish, less greyish, throat darker, breast less extensively pinkish purple and orange, and wing shorter.

RANGE Moluccas and Australia, north occasionally to south New Guinea. Near sea level.

SUBSPECIES IN NEW GUINEA One, *regina* (Swainson); east Australia with one recorded in south New Guinea, on Daru Island.

NESTING [Nest: a scanty platform of twigs in a tree. A single egg, white. Australian data.]

REMARKS Rare in the New Guinea region, being known only from the islet of Daru off the south coast. Probably also occurs on the adjacent mainland.

***Ptilinopus superbus* (Temminck)**

Superb Fruit Dove. Length 8–9 in. Adult male: upperparts yellowish green with some bold black spotting; crown rich vinaceous purple; sides of head from eye to nape apple-green; hind neck and sides of neck and sides of upper breast rich brick-orange in which unique; wing quills black, the secondaries with some narrow yellow edging; upper wing-coverts like back except prominently dark blue at bend of wing; tail quills with inner vanes mostly blackish, outer vanes mostly greenish, except central pair generally green and others broadly tipped with grey; throat to central breast pearl-grey with purplish (mostly concealed) bases; central breast with a broad blue-black band in which unique; rest of underparts white with patches of green; under wing and tail surfaces dark to light grey; iris lemon-yellow; bill, basal half blackish, outer half grey with a light tip; feet purplish rose; wing 128 mm, tail 78 mm, exposed culmen 14 mm, tarsus 19 mm. Female: like male but upperparts generally green with a prominent blue-black nape spot; no bright coloration anywhere; underparts more greenish, less greyish and without the prominent blue-black breast band; smaller (wing 122 mm).

RANGE Sulu Islands, Celebes Islands, Moluccas, Aru Islands, widespread in New Guinea region, islands of Torres Strait and Australia; lowlands to 5,200 ft.

SUBSPECIES IN NEW GUINEA One, *superbus* (Temminck); Moluccan, western Papuan, and Aru Islands, islands of Geelvink Bay (Numfor, Japen), all New Guinea, northern Papuan Islands (Karkar, Manam), D'Entrecasteaux and Louisiade Archipelagos, Bismarck and Admiralty Islands, islands of Torres Strait and Australia.

NESTING Nest: a slight structure of sticks placed ten feet up and twelve feet from trunk in thickly leafed tree growing on edge of native garden.

REMARKS This is a fairly common to common species found in the forest

and forest edge, mangrove, and second-growth forests, where it is usually encountered alone or in pairs, but it is also found in flocks in the tops of tall fig trees. When such a flock is approached the individuals leave singly or in twos or threes, flying off noisily, while those remaining hide by freezing among the leaves.



***Ptilinopus pulchellus* (Temminck)**

Beautiful Fruit Dove. Length 7–8 in. Adults: upperparts yellowish green; crown vinaceous red; wing quills blackish to dark green on exposed edges, with some narrow buff to yellowish edging; tail dark with exposed surfaces green and tips paler; lores and throat whitish; malar region, sides of head, neck and upper breast grey to grey tipped with white; a narrow incomplete central breast band deep reddish purple in which unique; central abdomen and under tail-coverts yellow-orange; rest of underparts yellow and green; wings below grey, the coverts with narrow yellow edges; tail below dark grey with paler tips; iris deep yellow or orange with a yellow inner ring; bill olive-green; feet purplish. Male wing 112 mm, tail 67 mm, exposed culmen 13 mm, tarsus 20 mm. Female similar.



RANGE New Guinea region; lowlands to 4,000 ft.

SUBSPECIES Two similar ones:

a) *pulchellus* (Temminck); western Papuan Islands (Waigeu, Batanta, Salawati, Misol) and all New Guinea except portion occupied by *decorus*; upper breast uniform grey.
b) *decorus* (Madarasz); north New Guinea from Geelvink Bay to Astrolabe Bay; like *pulchellus* but upper breast grey prominently tipped with white.

NESTING Nest: a scanty platform of slender sticks and a few dead leaves, seven to ten feet up in top of short trees or on palm fronds of the forest substage. A single egg, white.

REMARKS Usually observed feeding alone or sitting quietly in slender trees low in the substage of the forest, but occasionally found perching on dead spires above the general forest canopy.

***Ptilinopus coronulatus* (G. R. Gray)**

Little Coroneted Fruit Dove. Length 7–7½ in. Adult male: upperparts generally green; fore half of crown pale greyish lavender to vinaceous purple edged posteriorly with yellow and usually with a deep purplish red line; primaries dark edged with green; secondaries green edged with yellow; tail chiefly green, paler at tips and more blackish on concealed portions; sides of head and malar region green faintly washed with blue; throat pale yellowish to grey; breast green with at posterior margin a small to large spot of purple followed by variable amounts of reddish

orange-yellow on abdomen and under tail-coverts; wings below grey with much green on coverts; tail below grey with paler tips; iris pale greenish shading to orange on outer edge; bill green; feet dark purplish red; wing 105–15 mm, tail 61 mm, exposed culmen 11 mm, tarsus 15 mm. Female: like male but crown duller.

RANGE New Guinea region, sea level to 3,300 ft.

SUBSPECIES Five:

a) *trigeminus* (Salvadori); Salawati and western Vogelkop.
b) *geminus* (Salvadori); islands of Geelvink Bay (Japen and Kurudu) and northern New Guinea (Takar to Manokwari); crown pale lavender-grey, throat spot large and yellowish white, breast spot pale purple and orange, under tail yellow.
c) *quadrigeminus* (A. B. Meyer); northern New Guinea (between Humboldt and Astrolabe Bays and islands along Mamberamo River, Manam Island); like *geminus* but throat spot smaller, less yellow, more greyish.
d) *huonensis* (A. B. Meyer); north coast of eastern New Guinea (Huon Gulf to Goodenough Bay); like *geminus* but crown darker, more dark greyish purple, breast spot larger and darker, under tail-coverts orange.
e) *coronulatus* (G. R. Gray); south coast of New Guinea (Mimika River to Milne Bay) and Aru Islands; like *huonensis* but lacking orange in underparts.

NESTING Nest: a very scanty structure of twigs and a few green leaves, placed five to fifteen feet up in a forest, often on flat palm fronds. A single egg, white; size 26·1 × 19·1 mm. Incubating birds (including males) permit a close approach and then flutter off in flight quite distinct from the usual direct flight.

REMARKS Usually a fairly common species of the lowland forests and second-growth formations, but also seen in swift flight over or perched in tops of savannah trees. Frequently seen in small parties of from three to six in common with other birds feeding in fruiting trees and often the most common pigeon encountered.

### *Ptilinopus iozonus* (G. R. Gray)

Orange-bellied Fruit Dove. Length 8–8½ in. Adults: upperparts green; the feathers of the middle back, scapulars, secondaries and some wing-coverts often with pale blue centres; in two subspecies the smaller wing-coverts deep red; sides of head and throat and most of breast green; lower breast and abdomen orange; under tail-coverts whitish with yellow edges; flanks green; wings below grey tinged with green on under wing-coverts; iris pale yellow to white; bill, olive-green base,

yellow tip; cere dull red; feet purplish red. Wing 109–27 mm, tail 47–52 mm, exposed culmen 13–17 mm, tarsus 21 mm.

RANGE New Guinea region and Aru Islands. Chiefly lowlands, rarely to 3,500 ft.

SUBSPECIES Five similar ones:

a) *humeralis* (Wallace); western Papuan Islands (Salawati, Waigeu), northwest New Guinea and south New Guinea (eastward to Noord River); wing-coverts blue and deep purplish red.
b) *pseudohumeralis* (Rand); upper Fly River; like *humeralis* but generally paler, more yellowish green.
c) *iozonus* (G. R. Gray); Aru Islands; like *humeralis* but no red in wing-coverts.
d) *finschi* (Mayr); coastal region of south-eastern New Guinea, west to Huon Peninsula in north and to Merauke district in south; like *iozonus* but throat with a wash of blue-grey.
e) *jobiensis* (Schlegel); northern New Guinea from Mamberamo River to Astrolabe Bay; Japen, Manam and Tarawai Islands; much like *finschi*.

REMARKS Usually fairly common, high in the forest where the species feeds, flies about in flocks of a dozen or so and perches on conspicuous perches in the tops of tall trees.

### *Ptilinopus rivoli* (Prevost)

White-breasted Fruit Dove. Length 9¼–10¼ in. Adult male: fore half of crown purplish red; rest of upperparts including wing-coverts dark apple-green; scapulars with indistinct to prominent blue-black centre spotting; wing quills above greyish black with some green on exposed edges; throat green tinged grey on chin; upper breast with a broad white (white and yellow in one subspecies) band; lower breast and upper abdomen green or with a vivid patch of dark purple; lower abdomen bright canary-yellow or greenish tinged with yellow; under wing and tail quills grey; the tail with a pale tip; under tail-coverts green or yellow; under wing-coverts greyish to greenish; iris orange with an inner ring of pale yellow; bill bright yellow shading to olive at tip; cere and nude line to eye lemon-yellow; feet dark rose; wing (measurements vary with subspecies) 125–44 mm, tail 70–84 mm, exposed culmen 14 mm, tarsus 22 mm. Female: generally uniform green with varying amounts of yellow on abdomen and under tail-coverts and slightly smaller.

RANGE Moluccas, islands of eastern Indonesia, New Guinea and its satellite islands east to Trobriands, Sudest and Rossel, Woodlark Islands, Bismarck Archipelago. Lowlands to 10,400 ft.

SUBSPECIES IN NEW GUINEA Four well-marked ones:

a) *prasinorrhous* (G. R. Gray); southern Moluccas (except Buru) to western Papuan Islands (Kofiau, Misol, Schildpad Islands, Salawati, Batanta, Waigeu, Gagi, and Gebe), small islands of Geelvink Bay including Numfor, Pulu Manim, Traitor's Island and Meos Korwar (no reliable records from Japen or Biak); breast band solid white and purple breast patch large and abdomen and under tail-coverts green; wing 130 mm.

b) *miquelii* (Schlegel); Meos Num and Japen, Geelvink Bay; like *prasinorrhous* but lacking purple patch and with uniform yellow abdomen and under tail-coverts; wing 126 mm.

c) *strophium* (Gould); east Papuan Islands, Bonvouloir group (East and Hastings Islands), Woodlark group (Egum and Alcester) and Louisiade Archipelago (Duchateau, Misima, Tagula and Rossel); perhaps also coastal islands between Port Moresby and Milne Bay; like *miquelii* but larger; wing 144 mm.

d) *bellus* (Sclater); mountains of New Guinea and Goodenough Island (subspecies?); like *prasinorrhous* but breast band white and yellow; lower breast with a smaller purple patch.

REMARKS Lowland and mountain forests.

### *Ptilinopus solomonensis* (G. R. Gray)

Splendid Fruit Dove. Length 7–7¼ in. Adult male: upperparts, head and neck all round green, darker on the head and neck; small spot in front of eye dark purple; underparts green with a broad breast band white and yellow; abdomen with a large dark lavender-purple patch; lower crissum and under tail-coverts bright yellow; iris yellow; bill lead-colour; feet plum-colour; wing 114 mm, tail 55 mm, exposed culmen 13 mm, tarsus 20 mm. Female: generally green thinly edged with yellow on abdomen; under tail-coverts uniform yellow; smaller than male (wing 109 mm).

RANGE Islands of Geelvink Bay in the New Guinea region, also widespread in the Bismarck Archipelago and the Solomon Islands.

SUBSPECIES IN NEW GUINEA One, *speciosus* (Schlegel); islands of Geelvink Bay (Numfor, Biak, Traitor's Island, and Marai Island).

REMARKS Lowland forests.

### *Ptilinopus viridis* (Linnaeus)

Red-breasted Fruit Dove. Length 7–8 in. Adult male: upperparts green; forecrown and fore half of head all round washed grey-blue; usually pale on chin; inner secondaries broadly edged or tipped with pale grey; lesser wing-coverts pale grey or green; rest of exposed wing

surfaces above green or yellowish green often with narrow yellow edges on secondaries; tail mostly greenish with an irregular whitish subterminal band; underparts green with lower throat to upper breast (or upper breast alone) rich vinaceous red in which unique; lower abdomen and under tail-coverts with much pale yellow to whitish; iris orange to red; bill orange at base to sulphur yellow at tip; cere red; feet carmine red; wing 110–22 mm, tail 55–64 mm, exposed culmen 12 mm, tarsus 21 mm. Female: similar to male but lacking red breast, and in several races grey wing coloration.

RANGE Southern Moluccas, western New Guinea region, D'Entrecasteaux and Trobriand Islands. Lowlands up to 1,900 ft.

SUBSPECIES IN NEW GUINEA Five closely similar ones:

a) *vicinus* (Hartert); D'Entrecasteaux Archipelago (Fergusson and Goodenough) and Trobriand Islands.
b) *geelvinkianus* (Schlegel); islands of Geelvink Bay (Numfor, Pulu Manim, Biak and Marai near Japen) [one doubtful record from Manokwari].
c) *pseudogeelvinkianus* (Junge); Meos Num Island; a doubtful race.
d) *pectoralis* (Wagler); western Papuan Islands (Gebe, Waigeu, Gagi, Kofiau, and Misol) and north-west New Guinea east in north to Geelvink Bay and in south to Triton Bay.
e) *salvadorii* (Rothschild); Japen Island and northern New Guinea eastward to the Cyclops Mountains.

REMARKS Lowland forests.

### *Ptilinopus nanus* (Temminck)

Small Green Fruit Dove. Length 5–6 in. Adult male: generally dark apple-green; sides of upper breast grey; lower breast purplish; lower abdomen and under tail-coverts yellow; scapulars and secondaries blue-green tipped with yellow; primaries dusky with exposed edges greenish; iris grey-white; bill yellow with green tip; feet lilac to dark purplish red; wing 86–88 mm, tail 39 mm, exposed culmen 11 mm, tarsus 17 mm. Female: somewhat paler and lacking purple breast patch and grey on sides of breast.

RANGE New Guinea.

SUBSPECIES Two very similar ones:

a) *minimus* (Stresemann and Paludan); western Papuan Islands (Waigeu, Misol[?], Salawati).
b) *nanus* (Temminck); Vogelkop and south and south-eastern New Guinea to Hydrographer Mountains.

REMARKS Found in lowland forests. This species appears to be a rare bird in collections.

***Ptilinopus wallacii* (Gray)**

Wallace's Green Fruit Dove. Length 10½–11½ in. Adults: entire crown and lores rich vinaceous red; hind neck and upper back grey; middle back, scapulars and upper wing-coverts grey edged with greenish orange to yellowish green; lower back to upper tail-coverts uniform yellowish green; lesser upper wing-coverts uniform deep greenish orange; wing quills above blackish to deep green on exposed surfaces; tail quills above yellowish to brownish green abruptly becoming pale on outer third; throat whitish; breast grey followed by first a white band then a broad orange patch, then pale yellow to under tail-coverts; flanks green; wing and tail surfaces below blue-grey except outer third of tail whitish; iris reddish orange; bill sulphur yellow; feet pale carmine to crimson. Wing 156 mm, tail 80 mm, exposed culmen 15 mm, tarsus 23 mm.

RANGE Islands of eastern Indonesia (Babar, Banda, Timorlaut, South-east islands of Kur and Tayandu, Kei), Aru Islands and south New Guinea (Mimika and Noord Rivers).

REMARKS Found in lowland forests near coasts and rivers.

***Ptilinopus aurantiifrons* (Gray)**

Orange-fronted Fruit Dove. Length 9 in. Adults: forehead and lores orange-yellow; rear half of head, nape and sides of head including malar region dark apple-green followed by a complete dark blue-grey collar; upper back pale grey with variable amounts of yellowish green tipping; rest of upperparts uniform yellowish green; exposed upper surfaces of wing predominantly yellowish green, the coverts with variable amounts of grey, the secondaries with some narrow yellow edging; tail above yellowish green with a pale subterminal band except on central rectrices; chin, throat and sides of upper neck white; lower neck and upper breast blue-grey; rest of underparts green, the lower abdomen and under tail-coverts with much pale yellow; under wing and tail surfaces chiefly grey, the latter with a pale tip; iris red-orange to yellow; bill yellow with a crimson cere; feet red. Wing 131 mm, tail 61 mm, exposed culmen 17 mm, tarsus 22 mm.

RANGE Western Papuan Islands (Misol, Batanta, Salawati), Japen and Aru Islands, all New Guinea except the portion in the north-east (between the Sepik River and Collingwood Bay), and D'Entrecasteaux Archipelago (Fergusson Island). Lowlands up to 1,000 ft.

NESTING Nest: a loose, open platform of dead twigs, placed on a flat tree

fork in riverine forest eight to fifteen feet up, often near or over water or in savannah trees. A single egg, white.

REMARKS Found in forests and forest edges along watercourses, and in savannah trees. Often found perching on exposed branches above the forest.



***Ptilinopus ornatus* (Schlegel)**

Ornate Fruit Dove. Length 9¾–10½ in. Adult male: complete crown and sides of head greenish mustard-yellow to mustard-brown or deep vinaceous red (subspecies); collar on hind neck blue-grey to grey joining grey of throat; foreback, sides of neck dark vinaceous brown to pale greenish brown; rest of upperparts yellowish green to green, but wing with a bold patch on lesser coverts vinaceous red, with median coverts largely grey edged with sulphur brown and greater coverts and secondaries with much narrow yellow edging; flight quills largely blackish; tail above green with a broad subterminal band dull yellow; throat and malar region pale grey; lower throat orange-brown shading to dark orange-maroon on breast; rest of underparts green except lower abdomen and under tail-coverts with much pale yellow; iris, inner ring yellow, outer ring orange; bill greenish yellow; feet purplish red; wing 154 mm, tail 71 mm, exposed culmen 18 mm, tarsus 24 mm. Female: similar but upper back, sides and upper breast more greenish, less dark brown.



RANGE New Guinea; lowlands to 4,100 ft.

SUBSPECIES Three, one very distinct:

a) *ornatus* (Schlegel); Vogelkop; crown and sides of head vinaceous red.
b) *kaporensis* (Rothschild and Hartert); Onin Peninsula east to Fly River; much like *gestroi*.
c) *gestroi* (D'Albertis and Salvadori); south-east New Guinea west in south to Yule Island region and west in north to Mamberamo River; like *ornatus* but crown and sides of head mustard-yellow.

REMARKS Found in lowland and hill forest. Usually very common.

***Ptilinopus perlatus* (Temminck)**

Pink-spotted Fruit Dove. Length 9¾–10¾ in. Adults: head and nape yellowish green to blue-grey; mantle yellowish green to green, the scapulars and median coverts with bold pinkish red centres, in which unique; sides of head and upper neck like crown; throat, malar region, and often sides of hind neck grey; lower throat, upper breast and sides of breast brownish; rest of underparts yellowish green except much yellowish white on lower abdomen and under tail-coverts; flight quills below grey, the tail with paler tip; iris dark red with a yellow inner

ring; bill and cere olive yellowish; feet purplish. Wing 156 mm, tail 77 mm, exposed culmen 22 mm, tarsus 27 mm.

RANGE New Guinea area. Sea level to 4,000 ft.

SUBSPECIES Three, one very distinct:

a) *perlatus* (Temminck); western Papuan Islands (Waigeu and Salawati), Japen Island and north-east New Guinea east in north to Mamberamo River and in south to Triton Bay; head and nape yellowish green; upper breast mustard-brown.
b) *zonurus* (Salvadori); Aru Islands and south New Guinea from Kapare River region to Milne Bay, also D'Entrecasteaux Archipelago (Fergusson, Goodenough and Normanby); like *perlatus* but head paler and upper breast darker.
c) *plumbeicollis* (A. B. Meyer); north-east New Guinea from Astrolabe Bay to Huon Gulf; like *zonurus* but head blue-grey.

REMARKS The pink-spotted fruit dove is fairly common in forests, forest edges and spaced out in trees in native gardens and bordering streams.

### *Megaloprepia magnifica* (Temminck)

Magnificent Fruit Dove. Length 11½–13 in. Adults: chin, sides and top of head and neck grey tinged green on nape; upperparts green with the wing-coverts and inner secondaries prominently and variably marked with yellow to white; central line on throat, widening to cover breast and belly rich vinaceous maroon-red in which unique; crissum greenish yellow to yellow; under tail-coverts greyish green to green; flight quills below sooty with much rufous brown on inner vanes; under wing-coverts yellow; iris scarlet-red; cere red; bill greenish yellow, deep purple near nostrils; feet grey-green. Wing 162–5 mm, tail 129 mm, exposed culmen 19 mm, tarsus 25 mm.

RANGE New Guinea region and Australia; from sea level to 2,500 ft.

SUBSPECIES IN NEW GUINEA Four quite similar ones:

a) *puella* (Lesson); western Papuan Islands (Waigeu, Batanta, Salawati, Misol, Gemien) and Vogelkop; wing spotting whitish; crissum dark yellow; under tail-coverts dull green.
b) *interposita* (Hartert); Wandammen district to east Geelvink Bay and south New Guinea from Onin Peninsula to Fly River region; like *puella* but crissum paler and wing markings darker, more yellowish, less whitish.
c) *poliura* (Salvadori); south-east New Guinea west in north to Huon Gulf and west in south to Merauke district; like *interposita* but crissum duller, more olive-yellow, under tail-coverts paler and wing spotting richer, more yellowish.

d) *septentrionalis* (Meyer); northern New Guinea from Mamberamo River to Astrolabe Bay, also Japen, Manam and Karkar Islands; like *poliura* but upper back more tinged grey and wing spotting still richer yellow.

NESTING Nest: a small, shallow pad of woody tendrils and a few small twigs twelve to twenty-five feet up in a flat tree fork or on a palm frond in the forest substage. A single egg, elongate ovate; size 34·1 × 22·3 mm.

REMARKS The magnificent fruit dove is a common, widespread species of the upper part of the forest. In contrast to most of the fruit doves it is usually solitary, although sometimes two or so will feed together with other birds in a fruiting tree.

### Key to *Ducula, Gymnophaps* and *Columba* Species

1 (a) A black band separates grey abdomen from pinkish breast: *D. zoeae.*
(b) A black collar across grey throat: *D. mulleri.*
(c) White chin and throat contrast with rest of dark underparts: *C. vittiensis.*
(d) Pale breast contrasts with dark throat and abdomen: *G. albertisii.*
(e) Not as above: 2.

2 (a) Underparts mostly buffy brown: 3.
(b) Abdomen maroon, breast lilac-grey: *D. pinon.*
(c) Underparts mostly white or grey, tinged lilac at most: 4.

3 (a) Upper tail-coverts and base of tail purple, crown pinkish buff, hind neck grey: *D. rufigaster.*
(b) Upper tail-coverts green, base of tail black, crown grey like hind neck: *D. chalconota.*

4 (a) Back white, sometimes tinged grey: 5.
(b) Back iridescent green or blue: 6.

5 (a) Under tail-coverts white, unbarred: *D. bicolor.*
(b) Under tail-coverts white, barred black: *D. spilorrhoa.*

6 (a) Narrow white band on forehead: 7.
(b) No narrow white band on forehead, no white eye-ring: *D. concinna.*

7 (a) Without a white eye-ring: 8.
(b) With a white eye-ring: *D. pistrinaria.*

8 (a) Smaller, wing 212–18 mm: *D. pacifica.*
(b) Larger, wing 240–65 mm: *D. myristicivora.*

### *Ducula pacifica* (Gmelin)

Pacific Fruit Pigeon. Length 13½–14½ in. Adults: cere and base of maxilla with a black knob followed by a narrow band of white feathers; head, neck and foreback powder-grey; rest of mantle oil-green, faintly burnished with bronze or blue; chin whitish; rest of head and

underside grey washed with pinkish lavender; under tail-coverts chestnut-brown; under wing-coverts grey; flight quills below sooty black; iris bright red; bill black; bill knob black; feet wine-red. Male wing 214 mm, tail 120 mm, exposed culmen 24 mm, tarsus 30 mm.

RANGE Small islands bordering north and south-east New Guinea (Seleo, Tarawai, Louisiade Archipelago, Duchateau, Terte and Suau), small islands in Solomons, Santa Cruz, New Hebrides, Loyalty, Ellice, Phoenix, Tonga, Fiji and Samoan Islands.

SUBSPECIES IN NEW GUINEA One, *tarrali* (Bonaparte).

REMARKS Very little is known about this species except that it favours small coral islands.

### *Ducula myristicivora* (Scopoli)

Island Imperial Pigeon. Length 15½–17 in. Adults: cere and base of maxilla slightly swollen to moderately knobbed (black) followed by a narrow band of white feathering; head, neck all round and foreback blue-grey, the nape tinged with pink in one subspecies; rest of mantle green to bronze-green with a metallic gloss; flight quills above blue-black; chin whitish; neck and forebreast grey; under tail-coverts chestnut-brown; rest of underparts grey washed with pinkish lavender; flight quills and under wing-coverts dark grey to sooty blackish; iris orange to scarlet; bill black; bill knob black; feet bright carmine. Male wing 248–61 mm, tail 135–46 mm, exposed culmen from base of knob 25 mm. Female slightly smaller.

RANGE Eastern Moluccas, western Papuan Islands and islands of Geelvink Bay.

SUBSPECIES Two well differentiated ones:

a) *geelvinkiana* (Schlegel); islands of Geelvink Bay (Meos Num, Numfor, Biak); like *myristicivora* but lacking maxilla knob; nape without pinkish tinge and upper back green burnished bronze.
b) *myristicivora* (Scopoli); western Papuan Islands (Gebe, Gagi, Gemien, Waigeu, Batanta, Sorong, Salawati, Schildpad Island, Misol) and small islands off the eastern coast of the Moluccan island of Halmahera (Weda Island, etc.); maxilla-cere wattle black; nape tinged with pink; mantle blue-green to green.

REMARKS On Biak Island this bird was very common both in secondary growth and original forest.

### *Ducula concinna* (Wallace)

Elegant Imperial Pigeon. Length 17–17¾ in. Adults: forehead to foreback all round grey, tinged with pink on nape; rest of mantle blue to

green faintly burnished bronze; flight quills blue-black; chin to abdomen light grey; under tail-coverts chestnut-brown; iris dark chrome-red; bill slate-black; feet pale carmine. Male wing 270 mm, tail 162 mm, exposed culmen 20 mm, tarsus 37 mm. Female smaller (wing 259 mm).

RANGE Eastern Indonesian Islands (Talaut, small islets north and south of Celebes, Goram, Manawaka, Walubela, Banda, Sermata, Tenimber, Kei) and the Aru Islands of the Papuan region.

SUBSPECIES IN NEW GUINEA One, *separata* (Hartert); found on Sermata, Tenimber, Kei and Aru Islands, and Pul Adi.

REMARKS Very little is known about this species.

### *Ducula pistrinaria* (Bonaparte)

Grey Imperial Pigeon. Length 16–17½ in. Adults: forehead and eye-ring white; crown to foreback, neck all round and underparts grey; throat and often forebreast washed with pinkish lavender; mantle to upper tail-coverts dark glossy green often burnished bronze; flight quills blue-black to green; under tail-coverts dark chestnut; under wing-coverts grey; flight quills below dull brownish; iris dark red; bill slate blue; feet purplish red. Male wing 230–46 mm, tail 152 mm, exposed culmen 20 mm, tarsus 33 mm. Female smaller (wing 210–34 mm).

RANGE Admiralty Islands, Bismarck Archipelago, small islets off north and south-east coasts of New Guinea, Solomon Islands, Feni Nissen and Lihir Islands.

SUBSPECIES IN NEW GUINEA Two similar ones:

a) *rhodinolaema* (Sclater); Admiralty Islands, New Hanover, Rook Island; in New Guinea region, small islands of Astrolabe Bay (Long Island, etc.), Manam; male wing 246 mm.
b) *postrema* (Hartert); islands east of New Guinea (Deboyne Island, Amphlett group, Woodlark group, Bramble Haven and Misima), also perhaps small islands off Cape South; male wing 230 mm.

REMARKS The grey imperial pigeon appears to favour small islands where it is found in tall trees near coral beaches and mangrove swamps.

### *Ducula bicolor* (Scopoli)

White Nutmeg Imperial Pigeon. Length 16–17 in. Adults: primaries, secondaries, alula and a broad terminal tail band black; rest of bird uniform white; iris bright coffee-brown; bill pale reddish yellow; feet red-orange. Wing 127 mm, tail 114 mm, exposed culmen 22 mm, tarsus 29 mm.

RANGE Small islands from coast of India, Indochina and Philippines, eastward to Aru Islands, western Papuan Islands (Sorong, Salawati, Misol) and islands of western coast of Geelvink Bay (near Manokwari).

NESTING [Nest: a flat platform in tall trees or coconut palms. Eggs two(?), white; size 48 × 36 mm. Asiatic data.]

REMARKS Apparently a common fruit-eating species given to moving about in flocks. Particularly fond of small oceanic islands.

***Ducula spilorrhoa* (G. R. Gray)**

Torres Strait Imperial or Nutmeg Pigeon. Length 15½–17 in. Adults: primaries, secondaries, alula, a broad terminal tail band and barring on sides of lower abdomen and under tail-coverts greyish black to black; rest of bird white to greyish white; iris dark brown; bill dull yellow to greenish yellow; feet bluish grey. Wing 242 mm, tail 145 mm, exposed culmen 21 mm, tarsus 29 mm.

RANGE Admiralty Islands, Bismarck Archipelago, New Guinea, Aru Islands, islands of Torres Strait and Australia.

SUBSPECIES Three:

a) *spilorrhoa* (Gray); Aru Islands, islands of Geelvink Bay (Japen, Meos Num, Biak), north coastal islands (Kumamba, Yamna, Manam and Karkar), coast of eastern New Guinea west in north to Geelvink Bay and in south to Grange Island, D'Entrecasteaux Archipelago, Trobriand, Woodlark and Louisiade Islands, Mimika River, south-west New Guinea (subspecies?); light feathering ivory-white.
b) *melvillensis* (Mathews); northern and eastern Australia and Hall Sound district of south-eastern New Guinea; like *spilorrhoa* but separable?
c) *tarara* (Rand); south New Guinea from Fly River west at least to Merauke; like *spilorrhoa* but light feathering of head all round and of most of rest of bird grey to dirty white.

NESTING Nest: an open platform of slender twigs and sticks, 180 to 300 mm across, placed ten to forty feet up in a flat fork or lateral branch, usually near or over water on the forest edge or in tree clumps. A single egg, ovate, white; size 44·5 × 31·4 mm.

REMARKS Common in and near taller savannah forest and forest edge. Flocks of from five to twenty-five birds may commonly be seen, particularly in morning and evening when the birds move to and from special roosting trees (which may be solitary savannah trees). The species in common with some of the other species of Duculas, engages in spectacular aerial flights which are probably part of the mating

ceremony. Occasionally, as two birds are flying along, one sets its wings in a depressed position and glides sharply upward. When its momentum is lost, it raises its wings and swoops downward to continue its flight.

***Ducula müllerii* (Temminck)**

Müller's Imperial Pigeon. Length 15–16 in. Adults: top of head to below eye greyish vinaceous edged narrowly on sides and nape with grey and followed by a complete broad black neck collar in which unique; lower hind neck, foreback and foresides deep maroon to brown and somewhat glossy; rest of upperparts and wings dark grey; tail same but with broad pale central bar; throat and neck excepting black collar pale grey; rest of underparts greyish vinaceous brown; under surfaces of wings and tail above and below dark grey, the latter with a broad white medial band; iris brown; bill grey, darker at tip; feet purplish red. Wing 216–41 mm, tail 140 mm, exposed culmen 21 mm, tarsus 29 mm.

RANGE New Guinea and Aru Islands. Near sea level.

SUBSPECIES Two similar ones:

a) *aurantia* (A. B. Meyer); north New Guinea from eastern shore of Geelvink Bay to Astrolabe Bay.
b) *müllerii* (Temminck); Aru Islands, south New Guinea from Mimika River to the Brown River.

NESTING Nest: a scanty flat platform of slim twigs and sticks, 250 to 300 mm across, placed on a densely leafed branch six to twenty feet above water in trees fringing lakes and rivers. A single egg, white; size 47·7 × 34·3 mm.

REMARKS This species is common in the denser tree growth bordering mangrove swamps, rivers and lakes near sea level, but it also occasionally frequents the forest to feed. The bird is usually encountered singly or in pairs.

***Ducula pinon* (Quoy and Gaimard)**

Pinon Imperial Pigeon. Length 17½–19 in. Adults: forehead and chin narrowly white; naked area encircling eye bright rose usually rimmed narrowly with white feathering; throat, neck all round, foreback, foresides and upper breast pale to dark lavender-grey becoming darker on lower breast; abdomen dark maroon-brown; under tail-coverts chestnut-brown; tail blackish grey with a narrow, vivid, whitish medial bar; under wing surfaces sooty grey; back and upper wing variable grey and black depending on subspecies; tail black with a narrow whitish bar near tip; iris ruby-red shading to vermilion at

pupil; bill dark grey with pale grey tip; feet bright rose. Wing 251–73 mm, tail 140–50 mm, exposed culmen 27 mm, tarsus 40 mm.

RANGE Widespread in Papuan region from Aru and west Papuan Islands eastward over New Guinea to D'Entrecasteaux and Louisiade Archipelagos. Lowlands.

SUBSPECIES Four similar races:

a) *pinon* (Quoy and Gaimard); western Papuan Islands (Misol, Salawati, Batanta, Waigeu); Aru Islands, Vogelkop, south New Guinea from Mimika River to Hall Sound; crown pale grey; white feathering ringing eye; scapulars black; upper wing and upper tail-coverts uniform deep grey.

b) *rubiensis* (Meyer); south shores of Geelvink Bay (from Ron Island southward), Onin Peninsula and south coast of New Guinea east to Etna Bay, also south-eastern New Guinea from Holnicote Bay and Aroa River eastward; like *pinon* but upper wing-coverts scalloped with grey, not uniform dark grey.

c) *jobiensis* (Schlegel); Japen Island, north New Guinea from east coast of Geelvink Bay to Huon Gulf, also Manam and Karkar Islands; like *pinon* but upper wing and upper tail-coverts broadly scalloped with pale ash-grey.

d) *salvadorii* (Tristram); D'Entrecasteaux Archipelago (Fergusson and Goodenough Islands), Louisiade Archipelago (Misima, Tagula and Rossel); like *pinon* but crown vinaceous grey and lacking white eye-ring.

NESTING Nest: a flat platform of slender sticks thirty-five to sixty feet up on a flat branch. A single egg, white.

REMARKS This is a fairly common lowland species where it is usually found in the upper tier of the canopy of the forest, but sometimes it frequents tall savannah trees.

### *Ducula rufigaster* (Quoy and Gaimard)

Purple-tailed Imperial Pigeon. Length 13–15½ in. Adults: head to fore neck all round pale pinkish lavender; eye-ring and foreback blue-grey; naked area encircling eye dark red; mantle green more or less glossed purplish red in some lights, especially on foreback; rump, upper tail-coverts and basal two-thirds of tail (from above) largely dark purplish red; tail tipped broadly with grey; throat to forebreast lavender grey-brown; rest of underparts including under wing-coverts rufous to ochraceous brown, paler on abdomen and whitish on under tail-coverts; iris dark red; bill dark brownish to black; feet bright red. Wing 194–205 mm, tail 96–130 mm, exposed culmen 19 mm, tarsus 33 mm.

RANGE Moluccan Islands to New Guinea region; from lowlands to 3,200 ft.

SUBSPECIES Three:

a) *rufigaster* (Quoy and Gaimard); western Papuan Islands (Waigeu, Misol, Batanta, Salawati), Vogelkop east to head of Geelvink Bay and to Etna Bay; male wing 193 mm; breast dark rufous brown; upper tail-coverts dark purple.
b) *pallida* (Junge); south-west New Guinea between Etna Bay and Fly River region; like *rufigaster* but larger (male wing 204 mm) and breast and abdomen paler.
c) *uropygialis* (Stresemann and Paludan); Japen Island and north New Guinea from Mamberamo River to Huon Gulf; like *rufigaster* but back and rump less purplish red, more uniform green and underparts paler.

REMARKS The purple-tailed imperial pigeon is a fairly common species of the forest and edge of the savannah.

### *Ducula chalconota* (Salvadori)

Red-breasted Imperial Pigeon. Length 14½–15½ in. Adults: head to foreback dark blue-grey; rest of upperparts shining bottle green faintly to heavily washed with deep purplish red depending on direction of light; flight quills above blue-blackish; the tail with a dark grey tip; sides of head and forebreast like crown; chin, throat to upper breast pinkish ochraceous; rest of underparts ochraceous-rufous; iris purplish red; bill black; feet purplish red. Wing 211–21 mm, tail 145 mm, exposed culmen 19 mm, tarsus 32 mm.

RANGE Mountains of New Guinea; from 3,800 to 7,800 ft.

SUBSPECIES Two similar ones:

a) *chalconota* (Salvadori); mountains of Vogelkop (Arfak, Tamrau) and Wandammen Peninsula; back and rump tinged with purplish brown.
b) *smaragdina* (Mayr); central and eastern mountains of New Guinea (Weyland, Nassau, Oranje, Sepik, Hagen, Saruwaged and south-eastern mountains); like *chalconota* but back and rump much less brown, more uniform green.

REMARKS This is a thinly distributed, uncommon to rare species of the mid and high mountain forests.

### *Ducula zoeae* (Lesson)

Zoe Imperial Pigeon. Length 15–16 in. Adults: head to nape all round grey; neck all round to foreback vinaceous ash-grey; back and upper

wing-coverts dark maroon; rump, upper tail-coverts glossy green; flight quills dusky with variable amounts of glossy green on exposed edges; sides of head grey; chin and throat whitish; neck to upper breast vinaceous ash-grey; across mid-breast a narrow black band; rest of breast to central abdomen grey; lower sides to under tail-coverts dull maroon-brown with whitish tipping; under wing surfaces blackish; tail below dull rufous; iris white with irregular outer rim black; bill dark-grey; skin around eye red; feet red. Wing 212–28 mm, tail 122 mm, exposed culmen 28 mm, tarsus 31 mm.

RANGE Aru Islands, western Papuan Islands (Salawati), islands of Geelvink Bay (Japen), New Guinea, D'Entrecasteaux Islands (Fergusson Island), and St Aignan Islands (Misima). Chiefly lowland and hill forest, but occasionally up to 4,500 ft.

REMARKS This species is fairly common in the forests of the lowlands and hills.

***Gymnophaps albertisii* (Salvadori)**

Mountain Pigeon. Length 13–14 in. Adult male: upperside grey to dark grey with a faint greenish sheen, narrowly edged (scalloped) with black except on head, neck and foreback; flight quills blackish except tip of tail grey; naked skin encircling eye bright geranium-red; chin, throat, malar region, ear-coverts and abdomen dark grey-brown to dark maroon-brown; lower neck to lower breast vinaceous grey-white often finely freckled with grey; shanks and under wing-coverts dark grey; iris scarlet; bill, maxilla grey with pale tip, mandible shading to dull rose at base; skin about eye red, cere blood-red; feet raspberry-scarlet; wing 197–206 mm, tail 142 mm, exposed culmen 19 mm, tarsus 24 mm. Female: throat generally more grey, less maroon and breast duller, more inclined to dusky freckling.

RANGE Moluccan Islands (Batjan Island), mountains of New Guinea, and Bismarck Archipelago. From 2,000 to 10,000 ft, occasionally near sea level.

SUBSPECIES IN NEW GUINEA One, *albertisii* (Salvadori); mountains throughout New Guinea, islands of Geelvink Bay (Japen), D'Entrecasteaux Archipelago (Goodenough Island), Bismarck Archipelago (New Britain and New Ireland).

REMARKS Usually encountered in small flocks feeding in the upper half of tall forest trees but occasionally found in parties of up to thirty birds flying with noisy wing-beats over and through the forest. The distribution of this pigeon is rather erratic with the birds apparently being absent from large areas of mountain forest where one would normally expect to find them.

***Columba vitiensis* (Quoy and Gaimard)**

Wood Pigeon. Length 14–14¾ in. Adults: upperside dark grey to sooty blackish, in certain lights reflecting iridescent pink, purple, and green, particularly on head, neck, upper back and rump; chin, throat, malar region and ear-coverts white; rest of underside lavender-brown with an iridescent pinkish purple cast; sides and undersurfaces of wing dark grey; iris yellow to yellowish brown; bill bright red, tip whitish; feet dark purplish red. Wing 219 mm, tail 129 mm, exposed culmen 20 mm, tarsus 26 mm.

RANGE Philippine Islands, Sulu Archipelago, North Borneo Islands, Lesser Sunda Islands, islands of eastern Indonesia (Banggai, Sula, Kei), Moluccas, widespread in the New Guinea region, Bismarck Archipelago, Solomon Islands, New Hebrides, New Caledonia, Isle of Pines, Loyalty Islands, Fiji Islands and Samoa Islands. Lowlands, occasionally up to 4,500 ft, very occasionally to 9,000 ft.

SUBSPECIES IN NEW GUINEA One, *halmaheira* (Bonaparte); islands of eastern Indonesia (Banggai, Sulas), Moluccas, Kei Islands, Bismarck Archipelago, Solomon Islands and widespread in New Guinea region, western Papuan Islands (Misol, Salawati, Waigeu), all New Guinea, Louisiade Archipelago (Misima, Tagula, Rossel). [Not recorded from Arus, islands of Geelvink Bay or D'Entrecasteaux Islands.]

NESTING [Nest with a single egg, placed ten to twenty feet up in fairly heavy timber (*Birds of Southwest Pacific*).]

REMARKS This species appears to be scarce and to occupy a narrow altitudinal range. Gyldenstolpe encountered a small flock in very high trees in the Wahgi Valley gorge.

**Key to *Macropygia* Species**

1 Total length 13–15 in.; neck and upper back usually glossy: *M. amboinensis.*
Total length less than 12 in.: 2.
2 Tail barred with black: *M. nigrirostris.*
Tail uniform brown; Karkar Island only: *M. mackinlayi.*

***Macropygia amboinensis* (Linnaeus)**

Amboina Cuckoo-dove. Length 13½–14½ in. Adult male: forehead and sides of head grey to pale cinnamon; crown to foreback pale brown to blue-grey, the neck to foreback region somewhat pinkish and glossed with pale green; rest of upperparts rufous brown; flight quills above uniform dark brown; throat buffy; neck and forebreast all round pale pinkish vinaceous brown variably barred with black, barring sometimes lacking; rest of underparts buffy white to deep ochraceous, shading to

rufous brown on under tail-coverts and under wing-coverts; iris pale grey ringed with rose; bill brownish grey; paler at ventral base; feet bright orange-red; wing 159–74 mm, tail 183–93 mm, exposed culmen 15 mm, tarsus 22 mm. Female: like male but crown more brownish, less greyish; foreback less glossy, and generally with narrow black barring; neck and upper breast less pinkish and usually with narrow black barring.

RANGE Eastern Indonesia (Sangir and Talaut Islands, Celebes, Peling, Banggai, Sula Islands, Kalidupa, Buton, Moluccas, Kei Islands), widespread in New Guinea region, Bismarck Archipelago, Lihir Islands. Lowlands up to 6,000 ft.

SUBSPECIES IN NEW GUINEA Eight:

a) *doreya* (Bonaparte); Aru Islands, western Papuan Islands (Kofiau, Misol, Salawati, Batanta, Waigeu), north-west New Guinea, eastward to heads of Geelvink and Etna Bays.
b) *maforensis* (Salvadori); Numfor Island, Geelvink Bay.
c) *griseinucha* (Salvadori); Meos Num Island, Geelvink Bay.
d) *balim* (Rand); Balim Valley, west central New Guinea.
e) *kerstingi* (Reichenow); Biak and Japen Islands, Geelvink Bay, central New Guinea from Weyland Mountains east in north to Astrolabe Bay and east in south probably to Fly River.
f) *cinereiceps* (Tristram); D'Entrecasteaux Archipelago (Fergusson and Goodenough Islands), south-east New Guinea west to Huon Gulf in north and Fly River in south.
g) *cunctata* (Hartert); Louisiade Archipelago (Misima, Tagula, Rossel).
h) *meeki* (Rothschild and Hartert); Manam Island.

NESTING Nest: a neat, rather substantial one with a firm basin-shaped depression, of small sticks and fragments of dead ferns ten to twelve inches across, placed three to fifteen feet up on a mass of vines and ferns in second-growth forest. A single egg, yellowish white; size 31·5 × 22·7 mm.

REMARKS This dove is fairly common in the forest substage and tall second growth where it is usually solitary or in pairs. Its call is a soft 'cou' repeated a number of times and its food is small fruits and seeds.

### *Macropygia nigrirostris* (Salvadori)

Black-billed Cuckoo-dove. Length 11¼–12 in. Adult male: upperside bright rufous brown to dark smoke-brown palest on forehead and neck, and with very faint dark barring on wing-coverts; rump, upper tail-coverts and tail rich chestnut-brown contrasted sharply with narrow black barring; throat narrowly ochraceous; rest of underparts including under wing-coverts and inner edges of most remiges rich rufous brown;

iris, broad outer ring deep yellow, inner ring brown; eyelids and ocular space maroon-red; bill black; feet scarlet; wing 144–52 mm, tail 143 mm, exposed culmen 13 mm, tarsus 20 mm. Female: upperparts and lower parts from throat to breast darker due to profuse narrow blackish barring.

RANGE New Guinea, Bismarck Archipelago, Lihir Islands. Lowland forests up to 4,700 ft, occasionally up to 7,000 ft.

SUBSPECIES IN NEW GUINEA One, *nigrirostris* (Salvadori); all New Guinea, Japen Island in Geelvink Bay, D'Entrecasteaux Archipelago (Goodenough Island).

REMARKS This is an uncommon to fairly common bird of the forest substage and second-growth forest where it is usually encountered alone or sometimes in small flocks.

***Macropygia mackinlayi* (Ramsay)**

Mackinlay's Cuckoo-dove. Length $10\frac{3}{4}$–$11\frac{3}{4}$ in. Adults: upperside ochraceous rufous to dark rufous brown, darker on back and wing-coverts; tail uniform dull dark brown; sides of head and underparts, including under wing-coverts and inner edges of remiges, light to medium chestnut-brown, palest on throat; large concealed surfaces of feathering of upper breast blackish; iris yellowish red; bill black; feet bright red. Wing 140–8 mm, tail 137 mm, exposed culmen 12 mm, tarsus 19 mm.

RANGE Santa Cruz Islands, Banks Islands, New Hebrides, Solomon Islands, St Matthias Islands, Squally Islands, Uatom Islands, Witu Islands, New Britain (Talasea district) and Karkar Island, north coast of New Guinea.

SUBSPECIES IN NEW GUINEA One, *krakari* (Rothschild and Hartert); Karkar Island off north coast of New Guinea; as described.

REMARKS This species prefers the substage of true forest near the sea coast [*Birds of Southwest Pacific*, and Mayr's *List of New Guinea Birds*].

***Reinwardtoena reinwardtsi* (Temminck)**

Great Cuckoo-dove. Length 19–21 in. Adult male: head, neck all round to foreback and underparts whitish to dark blue, darker on under tail-coverts and generally white on throat; back, scapulars, rump and tail (above) dark chestnut-brown; upper wing-coverts black (one subspecies) to dark chestnut-brown; wing quills mostly uniform black; undersurfaces of wing dusky to blackish; tail below predominantly light chestnut-brown on outer half; short lateral tail quills and basal halves of long tail quills chiefly ash-grey with broad dusky brown barring; iris narrowly white ringed with rose-red; bill brown to slate at tip;

eye-ring, facial skin and cere wine-red; feet bright purplish rose; wing 232–41 mm, tail 225–300 mm, exposed culmen 17–20 mm, tarsus 24 mm. Female similar, except iris yellowish white.

RANGE Moluccas, widespread in New Guinea region. From near sea level to 11,100 ft.

SUBSPECIES IN NEW GUINEA Two well differentiated ones:

a) *griseotincta* (Hartert); western Papuan Islands (Misol, Salawati, Batanta, Waigeu, Gemien), all New Guinea, islands of north New Guinea (Japen, Kumamba, Manam), D'Entrecasteaux Archipelago (Fergusson and Goodenough); light areas chiefly grey to dark blue-grey on abdomen and under tail-coverts; upper wing-coverts chiefly dark reddish maroon; wing 230 mm.
b) *brevis* (Peters); Biak Island; like *griseotincta* but smaller, wing 215 mm; head, neck and underparts chiefly white; upper wing-coverts chiefly black.

REMARKS The great cuckoo-dove is fairly common in the forest substage, forest edge and in clumps of second growth in the mid-mountain and alpine grasslands particularly in the vicinity of rocky gorges and large limestone sinkholes. The bird is usually solitary.

### Key to *Geopelia* Species

Length 7–8 in.; throat barred with black: *G. placida.*
Length 10–11 in.; throat plain grey: *G. humeralis.*

### *Geopelia humeralis* (Temminck)

Bar-shouldered Ground Dove. Length 10¼–11 in. Adults: upperside dull earth-brown boldly scalloped (tipped) with black, particularly on foreback and foresides; forehead, sides of throat and forebreast blue-grey; throat, abdomen and under tail-coverts white; sides and mid-breast tinged with pinkish buff; under wing-coverts and inner vanes of remiges largely chestnut-brown; central rectrices dark grey (above), remainder dull, chiefly dusky chestnut with broad whitish tips; iris lemon-yellow; eyelids pale blue; bill pale blue, tip white; feet maroon-red. Male wing 128–44 mm, tail 141 mm, exposed culmen 17 mm, tarsus 23 mm. Female slightly smaller.

RANGE Southern New Guinea, islands of Torres Strait and Australia. Lowlands.

SUBSPECIES IN NEW GUINEA One, *gregalis* (Bangs and Peters); south New Guinea between Princess Marianne Straits and Kemp Welch River.

NESTING [Nest: a platform of thin twigs and grass, placed in a low bush or tree in savannah or in mangrove areas. Eggs two, white. Australian data.]

REMARKS Locally common to fairly common in open areas of sparse, short grass near sea level. Particularly fond of disturbed places in and around human habitations and mangrove swamps near the coast.

***Geopelia striata* (Linnaeus)**

Peaceful Ground Dove or Zebra Dove. Length 7¼–8 in. Adults: upperside dark smoke-grey boldly scalloped (barring and tipping) with black, particularly on foreback sides; forehead, malar region blue-grey; throat white; forebreast and sides of neck with a collar formed by presence of narrow black barring; rest of underparts whitish tinged faintly with pinkish brown; under wing-coverts and axillaries deep chestnut-brown; wing quills dusky grey with some pale inner edging; tail (below) sooty grey, broadly tipped with white, except central four rectrices; iris lemon-yellow; face light blue; bill black; yellow along tomia; feet purplish pink. Wing 101–7 mm, tail 89 mm, exposed culmen 13 mm, tarsus 16 mm.

RANGE South-eastern Asia, Philippines, widespread in Malaysia, New Guinea and Australia. Introduced to Hawaiian Islands, St Helena and (?) Celebes. Lowlands, occasionally up to 1,500 ft.

SUBSPECIES IN NEW GUINEA One, *papua* (Rand); south and east New Guinea from the lower Markham River area and Port Moresby west in south to Merauke district.

NESTING [Nest: a frail platform of twigs, usually placed on a flat tree fork in a small tree. Eggs two, white; elliptical, size 21 × 15 to 22 × 16 mm. Australian data.]

REMARKS Common to abundant in the open lowlands, particularly in burned areas in the vicinity of human habitations such as towns, villages and gardens and in dusty, barren areas in fields and beside roadways. Often in flocks of up to twenty-five.

**Key to *Chalcophaps* and *Gallicolumba* Species**

1 Throat and breast white or grey contrasting with brown or black abdomen: 2.
  Not so: 3.
2 Back glossed green or bronzy: *G. beccari*.
  Back glossed purple: *G. jobiensis* (male).
3 Underparts mostly yellow or whitish: *G. rufigula*.
  Underparts mostly greyish or brownish: 4.

4 (a) Back brownish black with some purple gloss: *G. jobiensis* (female).
(b) Back, rump, and upper tail-coverts with a general greenish or bronzy gloss: *G. jobiensis* (female).
(c) Back reddish brown, upper wing with a large patch of iridescent green: *Chalcophaps stephani.*
(d) Back and part of wing iridescent green, rump black with two grey bars: *C. indicus.*



***Chalcophaps indica* (Linnaeus)**

Green-winged Ground Dove. Length 9–9¾ in. Adults: forehalf of body and underparts dark vinaceous rufous brown to dark purplish brown, often with forehead and superciliaries broadly whitish to slate-colour; under tail-coverts brownish grey to blackish; exposed surfaces of upper wing-coverts, secondaries, scapulars and back iridescent bronze-green to green often with white markings near bend of wing; rest of upperparts dark brown to blackish, rump with two grey bars; flight quills dark, some of the rectrices with pale tips; under wing-coverts and inner edges of wing quills (and basal halves of some tail quills) pale brown; iris dark chestnut-brown; bill orange to red, purple at base; feet purple. Wing 139–49 mm, tail 88 mm, exposed culmen 17 mm, tarsus 24 mm.



RANGE Widespread in Indomalaya from Kashmir, India, Indochina and Philippines south to Ceylon, Christmas Island, Andaman Island, Indonesia, New Guinea region, Australia, Lord Howe Island, Santa Cruz Islands, Banks group, New Hebrides and New Caledonia. Lowlands to about 2,000 ft.

SUBSPECIES IN NEW GUINEA Three:

a) *indica* (Linnaeus); Kashmir, India, Riukiu Islands, south over India, Malaya, Indochina, Philippines, East Indies, Moluccas and westernmost Papuan Islands (Gebe and Kofiau); abdomen pale greyish brown; forehead and superciliaries pale greyish to white.
b) *minima* (Hartert); islands of Geelvink Bay (Numfor, Biak, Meos Num); like *indica* but abdomen dark vinaceous brown.
c) *chrysochlora* (Wagler); Lord Howe Island, eastern and northern Australia, eastern New Guinea west in south to Oriomo River and west in north to middle Sepik River, islands of north-eastern and eastern New Guinea (Manam, D'Entrecasteaux, Trobriand, Woodlark, Bonvouloir, and Louisiade Islands); like *indica* but forehead and superciliaries vinaceous brown.



NESTING [Nest: a scanty platform of twigs, on a leafy flat branch, or on vines, or on ferns growing in a tree, as much as fifteen feet up. Eggs two, pale cream colour. Australian data.]

REMARKS Not uncommon in original and secondary forests where it

keeps pretty constantly to the ground in deep shade. Observed under the rubber trees of Koitaki plantation, also under patches of rain forest in lowland savannahs and bordering mangroves. Usually solitary or in pairs.

***Chalcophaps stephani* (Pucheran)**

Stephan's Ground Dove. Length 9½–10 in. Adult male: forehead white; median and greater upper wing-coverts, alula and outer vanes of secondaries iridescent dark bronze-green; rest of upperparts maroon-brown strongly tinged with purplish on foreback, neck and head; underparts dull rufous brown tinged with purple on forebreast and neck; iris dark brown; bill orange-red; cere, eye-ring and feet dark rose; wing 137–44 mm, tail 95 mm, exposed culmen 18 mm, tarsus 26 mm. Female: more brownish, less purplish.

RANGE Solomon Islands, Admiralty Islands, Bismarck Archipelago, all New Guinea, D'Entrecasteaux Archipelago, northern Papuan Islands, western Papuan Islands, Aru and Kei Islands, Celebes Islands. Sea level to 2,500 ft.

SUBSPECIES IN NEW GUINEA One, *stephani* (Pucheran); Admiralty Islands, Bismarck Archipelago, all New Guinea, D'Entrecasteaux Archipelago (Fergusson, Goodenough), northern Papuan Islands (Japen, Tarawai, Karkar, Manam), western Papuan Islands (Waigeu, Batanta, Salawati, Misol), Aru and Kei Islands.

REMARKS Common but difficult to observe in the substage and on the floor of rain forests. Solitary or in pairs.

***Gallicolumba rufigula* (Pucheran)**

Red-throated Ground Dove. Length 8½–9½ in. Adults: forecrown buff to ochraceous brown or dark grey-brown; hind crown dark grey-brown to dusky vinaceous brown; sides of head vinaceous brown to clear grey; rest of upperparts vinaceous red-brown; upper wing-coverts with narrow to broad, dark to light grey edges; lores and chin buffy to whitish; sides of neck and breast vinaceous greyish brown; rest of underparts including throat and neck orange-yellow (in life) and whitish in museum specimens; iris light brown; bill pale slate; purplish at base; feet pale purple. Male wing 130–9 mm, tail 82 mm, exposed culmen 15 mm, tarsus 29 mm. Female: slightly smaller.

RANGE New Guinea region. Lowlands, occasionally to 5,200 ft.

SUBSPECIES IN NEW GUINEA Five rather similar ones:

a) *rufigula* (Pucheran); western New Guinea from Vogelkop (Arfak Mountains) to head of Geelvink Bay (Weyland Mountains) and

western Papuan Islands (? subspecies) (Misol, Salawati, Waigeu); side of head with a distinctly grey patch; upper wing-coverts with broad clear grey edging contrasting sharply with rufous brown of wing and back.

b) *septentrionalis* (Rand); north New Guinea from Mamberano River to Huon Gulf; like *rufigula* but upper wing-coverts with narrower grey edging.

c) *orientalis* (Rand); south-east New Guinea west in north to Mambare River region and west in south to Yule Island district; like *rufigula* but sides of head more brownish, less greyish.

d) *alaris* (Rand); south New Guinea from Setekwa to Fly Rivers; like *rufigula* but side of head pale vinaceous brown without grey; wing-covert edges pale grey.

e) *helviventris* (Rosenberg); Aru Islands; like *alaris* but edgings of upper wing-coverts grey strongly tinged with vinaceous.

NESTING Nest: a flat platform of dead leaves and a few slender twigs, on a palm frond or 'bird's nest' fern in a tree; three to seven feet up in dark, dense forest. A single egg.

REMARKS The red-throated ground dove is a fairly common terrestrial and semi-terrestrial species of original forests. It is usually seen as it flushes from the forest floor. Living and freshly killed specimens have the breast and abdomen orange-yellow to bright orange. This coloration quickly fades, however, to whitish in museum specimens.

***Gallicolumba beccarii* (Salvadori)**

Beccari's Ground Dove. Length 7¼–7¾ in. Adult male: forecrown, sides of head, sides of neck and throat to upper breast dark to light grey; hind crown to upper tail-coverts dark oil-green (to greenish chestnut-brown in one subspecies); bend of wing and lesser upper wing-coverts purple to pinkish purple; rest of coverts like back; tail brown to sooty black with some pale tipping; lower breast to under tail-coverts blackish to slate-grey (brown with some purple tipping on sides of breast in one subspecies); flight quills and under wing-coverts below uniform dark grey (in one subspecies under wing-coverts and inner edges of flight quills pale chestnut); iris dark brown; bill black; feet vinaceous rose to red; wing 107–18 mm, tail 54 mm (63 one subspecies), exposed culmen 15 mm, tarsus 28 mm. Female: much duller, pale grey forehead and 'bib' largely replaced with dull brown and wings lacking purple coloration.

RANGE St Matthias and Squally Islands, Admiralty Islands, Bismarck Archipelago, Karkar Island, New Guinea mountains, Solomon Islands and Rennell Island. Lowlands to 7,500 ft.

SUBSPECIES IN NEW GUINEA Two very distinct ones:

a) *beccarii* (Salvadori); mountains throughout New Guinea; upperparts chiefly dark oil-green; under wing-coverts and wing quills below uniform sooty grey; lower breast and abdomen sooty grey to black; tail 54 mm.

b) *johannae* (Sclater); Bismarck Archipelago, Karkar Island; like *beccarii* but upperparts chiefly greenish rufous brown, and under wing surfaces not uniform in colour but, instead, the under wing-coverts and inner edges of flight quills pale chestnut; lower breast and abdomen brown with some purple tipping on sides of breast; tail 63 mm.

NESTING [Nest: unknown. Egg, white, long oval; size 33 × 22 mm. New Britain data.]

REMARKS Beccari's ground dove is variable in its abundance. On the mountains ringing the Wahgi region (Kubor, Bismarck, and Hagen Mountains) it is uncommon to common on the floor of rolling and steep forested slopes. In other areas, such as the Victor Emanuel and Hindenburg Mountains, it is apparently rare. When flushed from the forest floor it flies only a short distance before diving back to the ground. [The food is small and medium sized fruit and seeds, and small insects. New Britain data.]

### *Gallicolumba jobiensis* (A. B. Meyer)

White-breasted Ground Dove. Length 9½–10 in. Adult male: forehead, lores, broad stripe through eyes and a wide area from chin to upper breast white; rest of head, fore neck, and underside black; upperparts from lower neck and shoulders to central back, also scapulars, edges of inner secondaries and upper wing-coverts bright purple; flight quills fuscous; rump and upper tail-coverts blackish brown; iris brown; bill black; feet red; wing 141–52 mm, tail 72 mm, exposed culmen 17 mm, tarsus 26 mm. Female: like male but duller, with the light areas generally dark soiled grey instead of white, the dark areas dull grey instead of black, and the purple dorsal coloration much more restricted; smaller, wing 135 mm.

RANGE Bismarck Archipelago, New Guinea region and Solomon Islands. Lowlands to 7,000 ft.

SUBSPECIES IN NEW GUINEA One, *jobiensis* (Meyer); New Guinea except Vogelkop (from Momi westward), northern Papuan Islands (Japen, Karkar, Manam), D'Entrecasteaux Archipelago (Fergusson, Goodenough), and Bismarck Archipelago.

REMARKS The white-breasted ground dove is a little known and usually

scarce species chiefly of the lowlands where it lives on and near the ground under thick vegetation bordering the sea or larger rivers. It is also occasionally found along the edge of mountain rivers as high as 7,000 ft. A specimen flushed close to the sea in New Britain rose from a cleared spot on a little-used trail in semi-open stunted forest and flew to a fallen trunk lying nearby where it perched two feet above the ground.

***Henicophaps albifrons* (G. R. Gray)**

White-capped Ground Pigeon. Length 14½–16¼ in. Adults: forehalf of crown grey to white; rear crown to foreback deep sooty purple; back and scapulars blackish (with a deep green gloss in certain lights) to deep sooty grey on upper tail-coverts; upper wing-coverts dark broadly tipped with maroon; wing quills above blackish, the secondaries with large iridescent patches on exposed surfaces bronze to green; tail blackish; underparts dull powdery lavender-grey to sooty black, paler on throat, inclined to purple on sides of breast and rufous on under tail-coverts; under wing and tail surfaces dark grey; iris brown; skin around eye grey; bill brownish black, paler on tip of mandible; feet light rose to red. Male wing 193–205 mm, tail 131–6 mm, exposed culmen 32–35 mm, tarsus 32 mm. Female slightly smaller.

RANGE Aru Islands, western Papuan Islands (Waigeu, Gemien, Salawati, Misol); islands of Geelvink Bay (Japen) and New Guinea. Lowlands up to 6,500 ft.

SUBSPECIES Two well marked ones:

a) *albifrons* (Gray); western Papuan Islands (Waigeu, Gemien, Salawati, Misol), islands of Geelvink Bay (Japen) and all New Guinea; forecrown white; neck purplish brown; underparts largely pinkish grey.

b) *schlegeli* (Rosenberg); Aru Islands; like *albifrons* but forecrown darker, more soiled white to brownish grey; neck paler, underparts much darker, more sooty grey to black.

NESTING Nest: unknown. Egg (removed from female), white; size 38·9 × 28 mm.

REMARKS This is a common but rather elusive species of the pure rain forests. It moves about by walking on the ground or flying from low branch to low branch. Usually solitary or in pairs. Feeds chiefly on the ground. Call: a series of low coos.

***Trugon terrestris* (G. R. Gray)**

Thick-billed Ground Dove. Length 12½–14 in. Adults: upperside generally dark bluish grey to dusky olive-grey; forecrown, a broad stripe on sides of head below eye, chin and upper throat dull greyish; hind

crown and nape (with short crest) dark blue-grey followed by a nearly complete black neck collar; neck to mid-breast dark blue-grey to slate-colour; rest of underparts buffy white to rich fawn-brown, strongest on sides of lower breast and abdomen; under wing-coverts irregularly dark grey and whitish; flight quills below dark grey; iris red; bill, basal half black, tip whitish; feet pinkish white. Wing 177–86 mm, tail 132 mm, exposed culmen 20 mm, tarsus 47 mm.

RANGE New Guinea region. Sea level to 1,000 ft.

SUBSPECIES Three similar ones:

a) *terrestris* (G. R. Gray); Salawati and west New Guinea, east in north to head of Geelvink Bay and east in south to Etna Bay.
b) *mayri* (Rothschild); north New Guinea from east coast of Geelvink Bay to Humboldt Bay.
c) *leucopareia* (Meyer); south New Guinea from Mimika River to Milne Bay.

NESTING Nest: a substantial broad deep one (200 to 260 mm across and several centimetres deep) consisting of a basal platform of dead sticks, and on top of this a flattish nest of rootlets, bits of moss and dead leaves (130 mm across by 10 mm thick), placed near the back of a stick platform; on the ground against the base of a plank-buttressed tree (with the nest touching the trunk between two buttresses); in tall, not especially dense, rain forest. A single egg, white; size 27 × 38·9 to 28·2 × 39·5 mm.

REMARKS This is a shy, retiring, possibly not uncommon, species of the forest floor. It is usually found alone or in pairs. The birds flush within a few feet of one with a whirring grouse-like flight, then fly some distance through the forest before alighting, usually on the ground, but occasionally on fallen tree trunks.

### *Otidiphaps nobilis* (Gould)

Magnificent Ground Pigeon. Length 17½–19 in. Adults: head and nape all round black; hind neck to foreback like head (in one subspecies) or with iridescent green patch (one subspecies), or pale grey to white (two subspecies); back, scapulars, wing-coverts and most of secondaries deep reddish maroon to chestnut-brown (one subspecies); rump and upper tail-coverts oil-green (one subspecies), or green on rump and purple on upper tail-coverts (one subspecies), or purplish blue (two subspecies); underparts blackish purple (one subspecies), or blackish violet on breast and oil-greenish on abdomen (one subspecies); or dull oil-green on upper breast and dull purplish to blackish (one subspecies); iris bright orange-red to red; bill vermilion; feet, scutes yellow-orange edged with

crimson, nails black. Wing 185 (181–97) mm, tail 175 mm, exposed culmen 24 mm, tarsus 64 mm.

RANGE New Guinea region and Aru Islands. Sea level to 4,000 ft.

SUBSPECIES Four:

a) *nobilis* (Gould); western Papuan Islands (Batanta, Waigeu subspecies?), mountains of western New Guinea (Tamrau, Arfak, Wandammen, Weyland, upper Mamberano, Nassau, Oranje); hind neck patch iridescent green and purple; back deep reddish maroon, rump to upper tail-coverts violet to purple; underparts chiefly deep purple.

b) *cervicalis* (Ramsay); mountains of south-eastern New Guinea, Saruwaged, Bismarck and Sepik region; like *nobilis* but hind neck patch grey; rump and upper tail-coverts oil-green; underparts chiefly oil-green.

c) *insularis* (Salvin and Godman); D'Entrecasteaux Archipelago (Fergusson Island); like *nobilis* but hind neck blackish like head (with no neck patch); back much paler, more chestnut-brown; rump oil-green; upper tail-coverts purple.

d) *aruensis* (Rothschild); Aru Islands; like *nobilis* but hind neck patch whitish and very large; rump and upper tail-coverts pale purple to deep violet; neck and breast deep greenish blue; abdomen blackish purple.

NESTING Nest: a loose platform of thirty-five to fifty slender grey sticks averaging five to six inches long on sloping ground on downhill side and deep within the plank buttresses of a tall vine-covered tree, in rather open mountain forest averaging seventy feet high, in an area abundantly sheathed with moss and floored with nettles, broad-leaved short plants and thickly populated with leeches. A single egg, ovate, white.

REMARKS Apparently fairly common but very shy and retiring. Difficult to observe but commonly heard on the floor of hill and mountain forest. Found alone or in pairs. These birds flush with a decided whirring to a height of twenty feet, then fly some forty feet before returning to the forest floor to flee on foot. One watched before it flushed ran five feet, paused, elevated the tail, then depressed it to the ground in rapid sweeping motions five times, then turned and ran off rapidly for a distance of more than thirty-five feet. It was silent at all times. Call: a rather high-pitched, somewhat ventriloquial cry reminiscent of a dog crying in the distance.

***Caloenas nicobarica* (Linnaeus)**

Nicobar Pigeon. Length 12½–13 in. Adult male: head all round black;

nape crest and incomplete neck collar of immensely attenuated grey to iridescent green or green-bronze hackle plumes; rest of upperparts glittering iridescent green to bronze-brown; tail white; feathering at bend of wing, primaries and secondaries largely edged deep violet blue to blue-black; underparts chiefly deep slate-grey (upper breast) to deep oil-green with much dark blue edging; iris dark grey; bill black; feet dark purplish red; wing 242–52 mm, tail 81 mm, exposed culmen 25 mm, tarsus 43 mm. Female: like male but generally more brownish above and tail with much dark tipping and longer.

RANGE Greater part of the Indo-Australian island region from the Nicobar Islands and Mergui Archipelago eastward over the Sunda Islands, Philippines, Moluccas, New Guinea region, Bismarck Archipelago, Solomon Islands, also Palau Islands. Lowlands on small islands.

SUBSPECIES IN NEW GUINEA One, *nicobarica* (Linnaeus); greater part of Indo-Australian region (see above), Bismarck Archipelago, Solomon Islands and New Guinea region where known from western Papuan Islands (Pecan Islands near Misol, Kofiau, Sorong, Salawati, Waigeu), islands of Geelvink Bay (islands near Manokwari, Numfor, Ajawi, Biak, Meos Num, Japen), north Papuan Islands (Seleo, Tarawai, Karkar), and islands of east New Guinea (Normanby, Trobriand Islands, Woodlark groups), Louisiades (Misima, Renard, Tagulor, Duchateau, Deboyne, Rossel) and the Bonvouloir group (Hastings Island).

NESTING Nests on small off-shore and oceanic islands.

REMARKS Migrates from small islands where it breeds, to larger islands and to the mainland of New Guinea to feed on fallen fruit. Apparently not uncommon. Almost always encountered on the ground in deep tropical forest. [When flushed rises heavily and with much noise and then alights in low trees. Philippine data.]

### Key to *Goura* Species

1 Crest broadly tipped with white: *G. victoria.*
Crest uniform grey: 2.
2 Back grey to blackish, breast dark vinaceous brown: *G. scheepmakeri.*
Back partly dark maroon, breast chiefly blue-grey: *G. cristata.*

### *Goura cristata* (Pallas)

Common Crowned Pigeon. Length 24–28 in. Adults: crest to foreback blue-grey; central back and much of upper wing-coverts dark maroon; greater upper wing-coverts largely white with deep maroon tips; rest of upperparts including flight quills light to dark slate-blue; tip of tail

pale blue-grey; lores and sides of head with a black mask; underparts powder blue-grey often with highly variable, irregularly placed sooty to black patches; iris red; bill grey with a horn tip; feet reddish purple. Male wing 350–90 mm, tail 270 mm, exposed culmen 34–45 mm, tarsus 105 mm. Female: somewhat smaller, wing 318–45 mm.

RANGE Western Papuan region. Lowlands up to 350 ft.

SUBSPECIES Two similar ones, differing slightly in size:

a) *cristata* (Pallas); north-western New Guinea east in south to Etna Bay and east in north to Siriwo River (where it hybridizes with *G. victoria beccarii*); male wing 360–90 mm.
b) *minor* (Schlegel); western Papuan Islands (Misol, Salawati, Batanta and Waigeu); male wing 350–65 mm.

NESTING Nest: twenty-four to thirty feet up in tree ferns or mangroves. Egg, one.

REMARKS This splendid bird is a common inhabitant of the wet lowland forests where it spends most of its time on the ground feeding on fallen fruit. It lives in small parties and is reluctant to take flight when disturbed. If forced to do so it will fly with very noisy wing-beats a short distance to a high tree limb and will then wag its tail up and down (Bergman in Gyldenstolpe).

### *Goura scheepmakeri* (Finsch)

Sheepmaker's Crowned Pigeon. Length 28–31 in. Adults: crest powder-grey; upperparts generally sooty blue-grey to blackish; lesser, median and greater wing-coverts edged with dark reddish maroon, or greater wing-coverts with dark reddish maroon tipping (one subspecies); greater wing-coverts, except tips, ivory-white, or pale grey (one subspecies); tail dark with pale blue-grey tip; base of maxilla, lores and sides of head, chin, and an incomplete neck collar black; throat blue-grey; or throat to forebreast blue-grey (one subspecies); rest of underparts deep maroon-brown to blackish maroon; iris dark red; bill dark grey to light grey on outer third; feet, scutes of tarsus pinkish purple, of toes rose; and all outlines whitish. Male wing 364–78 mm, tail 260 mm, exposed culmen 35 mm, tarsus 97 mm. Lowlands up to about 350 ft.

RANGE Southern New Guinea.

SUBSPECIES Two very distinct ones:

a) *sclaterii* (Salvadori); southern New Guinea from Mimika to Fly Rivers; sides and ventral aspect of neck deep reddish maroon; bend of wing and lesser and median upper wing-coverts tipped with reddish maroon; wing speculum ivory-white.

b) *scheepmakeri* (Finsch); south-eastern New Guinea from Hall Sound to Orangerie Bay; like *sclaterii* but sides and ventral aspect of neck blue-grey; bend of wing and lesser and median coverts dark blue-grey to blackish; wing speculum pale grey.

NESTING Nest: a solid, neat, compact one of dead, coarse herbaceous stems, palm and lawyer cane leaves, and some sticks; with a slight concavity lined with leaf rachises, measuring 450 by 350 mm on top and 160 mm deep. A single egg, white; size 52 × 37·5 mm. Placed twelve to fifty feet up on a large lateral bough, or in a tree fork, in deep, fairly open tropical forest.

REMARKS Common in the drier and the flooded lowland forests, except that it has been virtually exterminated in areas adjacent to towns and villages. Usually found in flocks of from three to seven feeding together on the floor of the forest. When disturbed the flock walks or runs away, or if forced, disperses by flying noisily to high perches nearby in the middle tier of the forest. Then the birds balance themselves clumsily and gawk at the intruder below making easy targets of themselves.

***Goura victoria* (Fraser)**

Victoria Crowned Pigeon. Length 23–29 in. Adults: crest blue-grey broadly tipped with white in which unique; upperparts variable blue-grey to blackish; greater upper wing-coverts largely pale blue-grey (forming a pronounced light wing-bar) and broadly tipped with dark rufous brown; flight quills dark, those of the tail with light blue-grey tips; forehead, sides of head over eyes with variable amounts of black; rest of head, neck, forebreast and abdomen largely dark blue-grey; fore and sides of breast to upper abdomen dark vinaceous maroon; iris red; bill, basal half black, outer half grey; feet wine-red to brownish red. Wing 352–400 mm, tail 250–300 mm, exposed culmen 30–35 mm, tarsus 95–106 mm.

RANGE Northern New Guinea and Japen Island. Lowlands.

SUBSPECIES Two similar ones:

a) *victoria* (Fraser); islands of Geelvink Bay (Japen and [introduced?] Biak); like *beccarii* but much smaller: male wing 352 mm, tail 250 mm, exposed culmen 30 mm, tarsus 95 mm.
b) *beccarii* (Salvadori); north New Guinea between head of Geelvink Bay (at Siriwo River) and Astrolabe Bay, also south-eastern New Guinea in Collingwood Bay region (between Holnicote Bay and Mt Maneao); male wing 357–85 mm, tail 300 mm, exposed culmen 35 mm, tarsus 106 mm.

REMARKS Common in flat, lowland, and partly inundated tropical

forests except in areas accessible to man; usually extirpated in the vicinity of villages and towns. The victoria crowned pigeon travels in flocks of from two to ten or so, feeding on bare, muddy ground. When disturbed the birds flush to high branches overhead where they may easily be shot one at a time.

# Order 12 Psittaciformes

## Parrots, Lories, etc.

*One family*

### Family Psittacidae *Parrots, Lories,* etc.

*(316 species, forty-six in New Guinea)*

Parrots form a very distinct family of some 316 species which live chiefly in the warmer parts of the world. The Australia–New Guinea region is particularly rich in them, with some forty-six species recorded in New Guinea.

The New Guinea parrots are tree birds, though a few species may also feed on the ground; many species are common, conspicuous, and often noisy elements of the bird fauna. Fruit, seeds and flowers are usually the favourite foods. The pygmy parrots are, however, an exception. The brush-tongue of flower feeding lories is a striking structural adaptation. As far as is known the parrots all pair and nest in natural cavities in trees, or in holes which they excavate in tree trunks or arboreal termite mounds. The roundish eggs are white, the young hatch naked or with scant down and are cared for in the nest until they can fly.

#### Artificial Grouping of Parrots for Identification to Genus

GROUP I Size large, length 20 in. or more; no green in plumage.

GROUP II Size large, length 15 in. or more; with green in plumage.

GROUP III Size medium, length about 12 in.; no green in plumage; tail moderate, more than half wing length, rounded; quills broad.

GROUP IV Size medium to small, length 5–12 in.; plumage more or less green; tail about two-thirds length of wing, wedge-shaped at tip with outer feathers less than half length of central ones which taper to a narrow tip that gives these lories a slender, tapered appearance.

GROUP V Size medium to small, length 4½–13 in.; green in plumage; tail either (a) moderate, about two-thirds length of wing and with tip rounded, or (b) tail short, about half wing length or less, and pointed or rounded at tip.

GROUP VI Size very small, length 3–4 in.; plumage more or less green;

tail shorter than wing; no streaks on breast; no dark patterns on side of head.

GROUP I

1 Plumage mostly black; naked face pink-red: *Proboscíger* (one species).
2 Plumage mostly black but abdomen and patch in wings red: *Psittrichas* (one species).
3 Plumage mostly white: *Cacatua* (two species).
4 Plumage red except for blue abdomen and foreback: *Larius* (female, one species).

GROUP II

5 Plumage green except for red in flanks: *Larius* (male, one species).
6 Bill large and red; plumage yellow-green, pale yellow, and bluish with conspicuous patch on upper wing-coverts of black, yellow-edged feathers: *Tanygnathus* (one species).
7 Length 15–17 in. but more than half of length is contributed by long, ample tail of broad feathers; plumage either (a) whole underparts and head red and back green or greenish black, or (b) abdomen red, breast green or green and red, crown, neck and back green: *Alisterus* (two species).
8 Length up to 16 in. but more than half of this due to elongated, narrow tail feathers which are twice as long as next pair: *Charmosyna* (part, one species).

GROUP III

9 Plumage red patterned with black or blue: *Eos* (two species).
10 Plumage dusky brown to purplish black with or without patterns of red, orange or yellow:
(a) A yellow-orange band across throat and another across breast: *Pseudeos* (one species).
(b) Not so: *Chalcopsitta* (part, two species).

GROUP IV

11 Length 9–12 in.; head all round blackish or brown to blue; breast red barred with black: *Trichoglossus* (one species).
12 Length 7–9 in.; side of head green streaked yellowish; breast and part of abdomen red: *Neopsittacus* (two species).
13 Length 7 in.; breast and abdomen pale green with dark green streaks; forehead and forecrown red: *Psitteuteles* (one species).
14 Length 4–10 in.; colour various, some mostly green, some with much red, some with streaked breasts: *Charmosyna* (part, seven species), *Oreopsittacus* (one species).

GROUP V

15 Length 12–13 in.; tail moderate; plumage mostly green with some red; breast (and sometimes back) streaked orange or yellow: *Chalcopsitta* (part, one species).

16 Length 10–12 in.; tail moderate; crown black; sides of head and throat and much of breast red: *Domicella* (two species).

17 Length 12 in.; tail moderate; underparts including under tail-coverts light green; red patch in upper wing-coverts: *Aprosmictus* (one species).

18 Length 5½–10 in.; tail moderate to short, rounded; with barring on breast and/or back or rump; under tail-coverts red; undersurface of tail blackish: *Psittacella* (four species).

19 Length 4½–10 in.; tail short; abdomen and under tail-coverts green:
(a) Size larger, length 8–10 in.; tail rounded, tail-coverts fall short of tail tip by about an inch: *Geoffroyus* (two species).
(b) Size smaller, length 6½–8 in. and tail pointed, or length 4½–5½ in. and tail rounded; under tail-coverts reach about to tip of tail: *Psittaculirostris* (three species) and *Opopsitta* (two species).

GROUP VI

20 Upper tail-coverts red, concealing most of tail which is soft-tipped: *Loriculus* (one species).

21 Upper tail-coverts not red; tail quills spine-tipped: *Micropsitta* (four species).

### Key to *Chalcopsitta* Species

1 (a) Plumage mostly black, with or without some red in forehead, cheeks: *C. atra.*
(b) Plumage mostly green with breast streaked yellow: *C. scintillata.*
(c) Plumage dark brown with yellow forehead and surround base of bill: *C. duivenbodei.*

### *Chalcopsitta atra* (Scopoli)

Black Lory. Length 12 in. Adults: plumage generally purplish black with head darker, to black (some subspecies differ in having red in forehead, in cheeks, concealed red in breast, red under wing-coverts and in bases of wing quills, red thighs, and blue in rump and under tail-coverts); undersurface of tail quills red basally, yellow distally; iris yellow-red to brown; bill black; feet grey-black. Wing 184 (172–86) mm, tail 121 mm, culmen from cere 22 mm, tarsus 20 mm.

RANGE Western New Guinea (Vogelkop, Onin and Bomberai Peninsulas and some satellite islands); in lowlands.

SUBSPECIES Four, differing chiefly in the amount of red in plumage:

a) *bernsteini* (Rosenberg); Misol Island; like *atra* but thighs with dark red and forehead usually tinged red.
b) *atra* (Scopoli); Batanta and Salawati and western part of Vogelkop; red only in basal part of underside of tail quills.
c) *insignis* (Oustalet); eastern part of Vogelkop and adjacent Amberpon Island; Onin and Bomberai Peninsulas; like *atra* but red in forehead and sides of head; concealed bases of neck and breast feathers, under wing-coverts and bases of wing quills, and thighs.
d) *spectabilis* (van Oort); known from one specimen; presumably a hybrid between this species and *Chalcopsitta scintillata* which are allopatric.

REMARKS This dark lory is a flower feeder which often travels in large flocks and seems to favour especially the forest edge or trees in clearings or savannah.

***Chalcopsitta scintillata* (Temminck)**

Greater Streaked Lory. Length 12 in. Adults: mostly green; the upper back, breast and abdomen with shaft streaks of yellow or orange; forehead, lores and upper part of cheeks red; crown, nape, most of side of head and chin black; throat and sides of breast suffused with red; thighs red; under wing-coverts red or green (subspecies); wing quills below dusky with a yellow area near base; upperside of tail quills green; underside of tail basally red, tip dusky yellowish olive; iris brown; bill and feet black. Male wing 180 (165–80) mm, tail 112 mm, culmen from cere 22 mm, tarsus 20 mm. Female slightly smaller.

RANGE Aru Islands, head of Geelvink Bay, and south New Guinea from Triton Bay to Kemp Welch River; lowlands.

SUBSPECIES Three:

a) *scintillata* (Temminck); head of Geelvink Bay and south New Guinea from Triton Bay to lower Fly River; under wing-coverts red with little green; wide yellow streaking of body.
b) *chloroptera* (Salvadori); southern New Guinea from upper Fly River to Kemp Welch River; like *scintillata* but under wing-coverts green and red or all green; streaking of body narrower; less yellow in the underside of wing quills.
c) *rubrifrons* (Gray); Aru Islands; like *scintillata* but with streaking of breast generally wider and more orange (less yellow); amount of red in forehead variable.

NESTING On the middle Fly River a pair of these birds was seen investigating a dead, hollow, pipe-like palm stub on the river edge. Possibly they were looking for a nest site.

REMARKS The streaked lory was a common bird on the south New Guinea savannahs and in the adjacent forest. It moved and fed in noisy flocks of up to thirty or more, and its local abundance seemed to be influenced by the periodic blooming of certain trees on whose flowers it fed.

### *Chalcopsitta duivenbodei* (Dubois)

Brown Lory. Length 12 in. Adults: much of plumage dark olive-brown but forehead, and a band from lores across side of head to throat orange-yellow; nape and side of neck with long, narrow feathers with obscure dull yellow streaks; lower back, rump, and under tail-coverts violet-blue; a patch of golden-yellow in wing-coverts; brown feathers of breast fringed with yellow and with concealed yellow at base; thighs, under wing-coverts and inner web of wing quills except at tip orange-yellow; eye grey-brown with outer iris orange; bill and feet black. Wing 175 mm, tail 131 mm, culmen from cere 28 mm, tarsus 18 mm.

RANGE North New Guinea from Geelvink Bay to Astrolabe Bay; in lowlands up to 500 ft.

SUBSPECIES Two:

a) *duivenbodei* (Dubois); western part of north New Guinea (east to Aitape area).
b) *syringanuchalis* (Neumann); eastern part of north New Guinea (west to Aitape area); like *duivenbodei* but feathers of back of head and neck darker and often with a dark violet sheen.

REMARKS This brown lory was only fairly common and usually seen in pairs or small parties of up to six or eight birds in the tops of the forest trees.

### Key to *Eos* Species

Head and neck red except for a blue patch on side of head: *E. cyanogenia.*

Head and neck red except for an irregular blue collar around neck: *E. squamata.*

### *Eos cyanogenia* (Bonaparte)

Biak Red Lory. Length 12 in. Adults: plumage red with a purplish gloss except for ear-coverts and feathers around eye purple-blue; upper wing-coverts, scapulars, outer web and tips of wing quills, two middle tail feathers and outer webs of lateral ones, and a spot on flanks, all of these are black; and the inner web of black tips of outer wing quills yellow; iris red; bill orange-red; feet black. Wing 158 mm, tail 103 mm, bill 22 mm, tarsus 20 mm.

RANGE Islands in Geelvink Bay only (Biak, Numfur and Manim).

REMARKS Red is a common colour in lories, but few are as completely red as this species and *Eos squamata*, both of which have restricted island distribution. Ripley on Biak Island found the present species common only near the coast in coconut trees in a single village, and did not find it inland. The birds flew singly and in small flocks.

***Eos squamata* (Boddaert)**

Moluccas Red Lory. Length 11 in. Adults: plumage mostly red except for a complete purple collar around neck, purple abdomen and under tail-coverts, black outer wing quills with red inner bases, black tips to inner quills and greater coverts, and some dull purple scapulars; purple-red tail quills, with red and golden undersurface. Wing 150 mm, tail 103 mm, bill 18 mm, tarsus 18 mm. Young: red with extensive purple tinging or edging.

RANGE Moluccas to western Papuan Islands.

SUBSPECIES IN NEW GUINEA Two:

a) *squamata* (Boddaert); Gebe, Waigeu and Batanta.
b) *attenua* (Ripley); Schildpad Islands (north of Misol); like *squamata* but collar on neck much reduced, only indicated or broken in some specimens.

REMARKS Presumably this is another of the species which favour small islands.

***Pseudeos fuscata* (Blyth)**

Dusk-orange Lory. Length 11 in. Some birds are much yellower than others. Adults: dusky brown birds with patches of red-yellow; upperparts, dusky brown with a yellow-orange patch on top of head and a yellow-orange band on nape; brown feathers of hind neck, and middle of back fringed with red, grey or olive; lower back and rump yellowish white; upper tail-coverts black; tail greyish or olive-purple, the central quills reddish towards base; wings with some purplish tinge, olive-tinged on outer edges of outer quills and a tinge of chestnut in inner greater coverts and inner wing quills; underparts dusky brown with a band of red-orange across throat; feathers of lower throat fringed with reddish to grey or olive; a band of red-orange across breast; red-orange abdomen and thighs; under tail-coverts purple-blue; undersurface of tail red towards base, olive towards tip; under wing-coverts and base of wing quills partly red (in some specimens the orange is replaced by yellow and red by orange); iris red; bill red or yellow; feet dusky. Wing 158 (140–75) mm, tail 87 mm, bill 22 mm, tarsus 17 mm.

RANGE New Guinea, Salawati and Japen Islands; lowlands and up to 5,500 ft.

SUBSPECIES Two:

a) *fuscata* (Blyth); Salawati Island and Vogelkop; wing 140–60 mm.
b) *incondita* (Meyer); Japen Island and all New Guinea except Vogelkop; like *fuscata* but larger; wing 144–75 mm and possibly paler; a rather poorly marked race.

REMARKS This is a bird found in both savannah and forest, feeding in flocks in the tops of flowering trees. Like some other lories the presence of this species seems to depend on the presence of flowering trees. At one mountain camp the species was seen only at one flowering tree. At another camp, 5,000 ft up on the mountain slopes overlooking the Idenburg River swamp plain, each evening long lines of squealing lories, presumably of this species and *Trichoglossus*, flew overhead as though coming from the lowlands to the north, and passed on to the higher hills to the south. This seemed to indicate a daily movement from feeding to roosting places. On the south side of the Snow Mountains, large sleeping roosts of thousands of birds have been reported.

### *Trichoglossus haematodus* (Linnaeus)

Rainbow Lory. Length 10–12 in. Adults: upperparts, forehead blue changing to dark brown-black or reddish brown on hind crown and nape and bordered posteriorly by a pale yellow-green neck band; rest of upperparts green except for some semi-concealed red on feathers of foreback; side of head blue shading to brownish black posteriorly; throat black, breast red barred with black or dark blue; abdomen green (to purplish black, subspecies) becoming yellowish with green bars posteriorly; flanks and under tail-coverts green and yellow; undersurface of tail olive, the inner webs of quills broadly edged yellow; under wing with a conspicuous yellow patch on dusky quills and red under wing-coverts; iris orange; bill with yellow tip; feet dusky. Wing 141 (127–48) mm, tail 105 mm, culmen from cere 20 mm, tarsus 18 mm. Young birds are duller, with more green and tail feathers are more pointed.

RANGE Lesser Sunda Islands to northern and eastern Australia, New Guinea area, Bismarck Archipelago, Solomon Islands, New Hebrides, and New Caledonia; in New Guinea lowlands and up to 6,000 ft.

SUBSPECIES IN NEW GUINEA Seven:

a) *berauensis* (Cain); western Papuan Islands, Numfor and Japen Islands in Geelvink Bay, and western New Guinea east to Hollandia in the north and upper Fly River in the south; abdomen dark green;

blue restricted to forehead and forepart of cheeks; top of crown tinged olive, nape tinged brown; wing 139–48 mm.

b) *rosenbergii* (Schlegel); Biak Island, Geelvink Bay; a very distinct race; like *berauensis* but with green band on hind neck much wider and yellower, and separated from black cap by a narrow red band; bars on breast broad and purplish blue as in abdomen; wing 130–6 mm.

c) *intermedius* (Rothschild and Hartert); northern New Guinea from Sepik River to Astrolabe Bay, also Manam Island; very similar to *berauensis* but on average with less blue in head; male wing 140–4 mm.

d) *micropteryx* (Stresemann); eastern New Guinea, west in the north to Huon Peninsula, in the south to Hall Sound, also Louisiade Archipelago (Misima Island); very like *intermedius* but smaller bill; wing 131–45 mm.

e) *massena* (Bonaparte); Karkar Island, Bismarck Archipelago, Solomon Islands and New Hebrides; like *micropteryx* but with narrower and greener band on hind neck, more olive washed ear-coverts; wing 127–34 mm.

f) *caeruleiceps* (D'Albertis and Salvadori); south New Guinea from Princess Marianne Straits to middle and lower Fly River; like *micropteryx* but with blue on top and sides of head much more extensive, crown and nape blacker and green of abdomen very dark to black; wing 131–45 mm.

g) *nigrogularis* (Gray); eastern Kei Islands and Aru Islands; like *caeruleiceps* but averages larger; wing 132–48 mm.

NESTING [In a hollow in a tree; eggs two, white. Australian data.]

REMARKS This is perhaps the commonest and most widespread of the New Guinea lories living in both savannah and forest. In forest country it is commonest in forest edges, in clearings by waterways, and in second growth. The bird is a flower feeder and like some other lories (and fruit bats) its presence in an area depends on the flowering of trees. We saw an example of this on the middle Fly River where we found no members of this species until a certain yellow-flowered tree came into bloom. The lories then arrived in numbers, travelling and feeding in small parties and in flocks.

On the slopes above the Idenburg River this species, like the dusky-orange lory, was often seen in conspicuous morning and evening flights which were composed of many large flocks, often containing scores of birds in long, squealing lines. These flights took the birds many miles and over thousands of feet of altitude between sleeping and feeding grounds. In west New Guinea massed evening flocks of thousands of birds have been reported.

These birds are noisy when perched or in flight, and their presence is advertised by shrill squeaking or chattering calls as the flocks dart overhead in swift direct flight or as the birds feed, continually hopping and walking about the branches and twigs, and not infrequently turning upside down as they cling to the ends of twigs and reach out for blossoms.

It seems that pairing takes place in flocks, as we saw on the Fly River. In one flock the birds were continually forming into pairs. One bird would approach another and they would try to grapple with each other. Usually the approached bird would swing under the branch, often with outspread, quivering wings, and the grappling and billing would continue until the engagement was broken off and feeding resumed. The only mating seen, however, was by a solitary pair on a high branch in the forest. Copulation was performed without ceremony, and the pair then flew away.

### *Psitteuteles goldiei* (Sharpe)

Red-capped Streaked Lory. Length 7½ in. Adults: forehead and crown red; nape blue which extends forward on sides to eye; rest of upperparts dark green streaked with pale green on hind neck; tail feathers uniform olive-green; side of head below eye pinkish purple sometimes streaked with black; underparts pale green with plentiful dark green streaks from lower throat to under tail-coverts; underside of tail quills yellowish olive; underside of wing quills greyish black with a larger yellow central area in inner ones; under wing-coverts like breast; iris brown; bill black; feet slaty grey. Wing 110 mm, tail 80 mm, culmen from cere 15 mm, tarsus 13 mm.

RANGE Central mountain ranges of New Guinea from Weyland Mountains to south-east New Guinea, from 4,500 to 7,000 ft.

REMARKS This seems to be an uncommon if not rare bird which lives in the upper parts of trees in the mid-mountain forest. The few records suggest it may be a quiet, non-flocking species.

### Key to *Domicella* Species

also known as *Lorius*

With blue or bluish area on back: *D. lorius*.
Without blue or black on hind neck or back: *D. hypoinochrous*.

### *Domicella hypoinochrous* (Gray)

also known as *Lorius hypoinochrous*

Eastern Black-capped Lory. Length 10–11 in. Adults: upperparts, top of head black; sides and back of neck, back, rump and upper tail-coverts

red, with an indistinct dusky red bar across interscapular area; upper surface of wing and scapulars green; tail red with a green and blackish tip; underparts, chin to breast red changing to purplish blue on abdomen; underside of tail dusky olive with concealed red base; iris red; bill red; feet black. Wing 175 mm, tail 98 mm, culmen from cere 27 mm, tarsus 25 mm.

RANGE South-eastern New Guinea, D'Entrecasteaux Archipelago, and other eastern satellite islands, Bismarck Archipelago.

SUBSPECIES Three:

a) *devittatus* (Hartert); south-eastern New Guinea east of Angabunga River and Huon Gulf, D'Entrecasteaux Archipelago, Trobriand Islands, Woodlark group, Long Island and Bismarck Archipelago; greater under wing-coverts all red.
b) *hypoinochrous* (Gray); Misima and Tagula Islands of Louisiade Archipelago; greater under wing-coverts red with black tips; breast lighter red than upper abdomen.
c) *rosselianus* (Rothschild and Hartert); Rossel Island of Louisiade Archipelago; like *hypoinochrous* but breast same red colour as upper abdomen.

### *Domicella lory* (Linnaeus)

also known as *Lorius lory*

Western Black-capped Lory. Length 10–12 in. Adults: crown black; sides of head, throat and most of breast red joining a red band across nape (sometimes absent; subspecies) and another across foreback which are separated by a blue or blue-black half collar on back and sides of neck; foreback blue behind red band; upper side of wing including scapulars green; lower back, rump and upper tail-coverts red; tail blue becoming red basally; throat and upper breast red which may or may not (depending on subspecies) be interrupted by having bluish black of abdomen extending forward and across sides of breast to meet blue half collar of hind neck; abdomen becomes blue posteriorly; thighs and under tail-coverts blue; undersurface of tail dusky yellowish olive, with a concealed red base; under wing extensively yellow except tips of flight feathers and (depending on subspecies) under wing-coverts mostly red or mostly black; iris red; bill red; feet black. Wing 160 (145–83) mm, tail 95 mm, culmen 24 mm, tarsus 18 mm.

RANGE New Guinea, western Papuan Islands and some islands in Geelvink Bay; lowlands, occasionally up to 5,000 ft.

SUBSPECIES Eight, some rather distinct; first four have under wing-coverts red; last four have them black; *cyanauchen* has no red collar on nape:

a) *major* (Rothschild and Hartert); Waigeu Island; under wing-coverts mostly red; blue of abdomen of limited extent on breast; size large, wing 167–79 mm.

b) *lory* (Linnaeus); Batanta, Salawati, and Misol Islands and Vogelkop; like *major* but smaller, wing 160–8 mm; band on hind neck darker blue, and blue-black of abdomen blacker and extends well on to breast and may even join blue collar on hind neck.

c) *rubiensis* (Meyer); southern part of Geelvink Bay, and south New Guinea from Onin Peninsula to Gulf of Papua; like *lory* but blue-black of abdomen extends barely on to breast and red band on foreback wider; size smaller, wing 145–65 mm.

d) *erythrothorax* (Salvadori); south-eastern New Guinea (west in south to Purari River in Gulf of Papua, in north to Huon Peninsula); very like *rubiensis* but larger, wing 160–78 mm.

e) *salvadorii* (Meyer); eastern north New Guinea (Astrolabe Bay to Aitape area); differs from all the above and agrees with all following in having under wing-coverts mostly blue-black (not red); blue-black of abdomen extends only on to posterior edge of breast; wing 152–75 mm.

f) *viridicrissalis* (de Beaufort); western north New Guinea (Humboldt Bay to Mamberamo River); like *salvadorii* but band on hind neck more blackish blue.

g) *jobiensis* (Meyer); Japen and Meos Num Islands in Geelvink Bay; like *salvadorii* but larger, wing 175–80 mm.

h) *cyanauchen* (Müller); Biak Island; like *jobiensis* but without red band on nape (unique in this) and dark of hind neck much bluer, less blackish; wing 170–83 mm.

REMARKS The black-capped lory lives in the upper parts of the forest trees where it feeds on flowers. It is only fairly common. Occasionally a number gather in one tree, but usually the species does not travel in flocks and it is more commonly seen, flying or feeding, in pairs. The call is a melodious whistle of several notes. One captive bird readily ate very ripe bananas, scooping up the soft pulp with its brush tongue which in the wild seems to be used almost entirely for flower feeding.

### Key to *Charmosyna* and *Oreopsittacus* Species

1 (a) Underparts all green with pale streaks: 2.
(b) Underparts mostly black: *C. papou* (melanistic).
(c) Unlike either of above: 3.

2 (a) Size small, length 4–5 in.; streaks on breast only: *C. wilhelminae.*
(b) Size medium, length 8 in.; streaks on breast and abdomen: *C. multistriata.*

3 (a) Underparts mostly green: 4.
(b) Entire side of head, throat and sides of neck at least red: 8.
4 (a) Side of face blue with a white line below eye: *Oreopsittacus arfaki.*
(b) Not so: 5.
5 (a) Some red in head, ear-coverts blue or green: 6.
(b) Little or no red in head, ear-coverts streaked yellow: 7.
6 (a) Upper throat red, rest of head green: *C. rubigularis.*
(b) Upper throat and forepart of face red, ear-coverts blue: *C. placentis* (male).
(c) Throat green, forehead red, ear-coverts blue: *C. rubronotata* (male).
7 (a) Upper tail-coverts with red: *C. rubronotata* (female).
(b) Upper tail-coverts without red: *C. placentis* (female).
8 (a) Size small, length 6½–7½ in.; yellow streaks on red breast which may be washed green: *C. pulchella.*
(b) Size medium, 9–10 in.; breast plain red, central tail feathers one inch longer than next pair: *C. josefinae.*
(c) Length 14–16 in.; central tail feathers twice length of next pair: *C. papou.*

***Charmosyna papou* (Scopoli)**

Fairy Lory. Length: including very long, central tail feathers, 14–16 in.; without elongated central pair of tail feathers, 9–10 in. A melanistic and a normally coloured phase known. Adult male, coloured phase: forehead and forecrown red; hind crown with a patch of variable size, blue anteriorly, black posteriorly; hind neck red (with a black cross bar in one subspecies); foreback and upper surface of wings green; rest of back and rump red and upper tail-coverts red or green with a blue patch of variable size on rump and shorter upper tail-coverts; central tail feathers mostly green, becoming yellow towards tip, others mostly yellow; side of head and underparts red with a black area extending across abdomen, flanks, and on thighs (in one subspecies with a yellow patch each side of breast and similar patches on lower flanks; in another subspecies with a complete yellow breast band); underside of tail mostly yellow or yellow-green; under wing mostly greyish black with smaller wing-coverts red; iris, bill and feet red or orange; wing 148 (138–51) mm, tail 260 mm (without central tail feathers 110 mm), culmen from cere 19 mm, tarsus 19 mm. Female: like male with lower back and sides of rump yellow; slightly smaller than male, wing 127–46 mm. In the dark phase much of the red is replaced with black.

RANGE Mountains of New Guinea from Vogelkop to south-eastern New Guinea; 5,000 to 9,000 ft.

SUBSPECIES Four rather distinct ones:

a) *papou* (Scopoli); Vogelkop; only the coloured form known; a yellow patch on each side of red breast and another on flanks; longer upper tail-coverts green; nape red followed by a black band on hind neck; female much like male.

b) *goliathina* (Rothschild and Hartert); mountains of the main part of New Guinea; like *papou* but breast all red; blue feathers of crown much longer; hind crown and nape are extensively black and no black bar on hind neck; female with yellow lower back; both melanistic and coloured phases known.

c) *stellae* (Meyer); south-eastern New Guinea (west to Angabunga River and Herzog Mountains); like *goliathina* but longer upper tail-coverts red (not green); both melanistic and coloured phases known.

d) *wahnesi* (Rothschild); Huon Peninsula; like *stellae* but with a wide, complete, yellow breast band; melanistic and coloured phases known.

REMARKS These lories may be rather conspicuous as they fly about through the treetops of the mountain forests, usually in twos, threes or fours when their squealing notes attract one's attention. When perched in trees feeding on their flowers or the flowers of epiphytes, where they associated with other parrots, honeyeaters and flowerpeckers, the lories were not only inconspicuous but extremely difficult to see.

A young bird kept alive for a time was very tame. It was very fond of sugar water, and it drank this by extending its brush tongue into the water, then retracting the tongue and apparently squeezing out the sugar water into its mouth and swallowing it. Fruits such as banana and paw paw were eaten in the same way, the softer parts being scooped up in the brush tip. The bill was not used to bite out pieces of the fruit.

### *Charmosyna josefinae* (Finsch)

Josefine's Lory. Length 9–10 in. Adult male: side and top of head and neck red, except for a black patch on nape which extends to eye and is greyish anteriorly; mantle dark green; lower back to upper tail-coverts red, except for a dusky spot on rump; central tail feathers dark red changing to yellow at tip; lateral tail feathers blackish and red basally and with broad yellow tips; underparts red except for black thighs; black patch on abdomen; undersurface of tail mostly yellow; undersurface of wing mostly greyish black with some red in wing-coverts; iris orange; bill red; feet orange; wing 125 mm, tail 125 mm, culmen from cere 18 mm, tarsus 15 mm. Female: like male but lower back green or yellow.

RANGE Mid-mountains of western and central New Guinea (Arfak to Sepik Mountains); 2,500 to 5,800 ft (sometimes near sea level?).

SUBSPECIES Three:

a) *josefinae* (Finsch); Vogelkop to Snow Mountains; male wing 118–30 mm, female wing 116–27 mm.
b) *sepikiana* (Neumann); mountains of Sepik region; like *josefinae* but black of abdomen more extensive and feathers of crown more grey, less lilac; females have the flanks and lower back yellow, not greenish.
c) *cyclopum* (Hartert); Cyclops Mountains; like *josefinae* but without black patch on abdomen and without greyish blue patch on crown in front of black nape or with these only indicated; male wing 120–5 mm, female wing 120 mm.

REMARKS On the mountains above the Idenburg this lory was fairly common but quiet and rather inconspicuous. In pairs, threes or fours it flew silently through the forest only occasionally giving a faint, high squeak. A climbing vine with large white flowers was especially attractive to them. They climbed slowly through the blooms feeding on them and were so unobtrusive that a casual glance would have missed them. In other flowering trees these lories were associated with various other flower feeders.

### *Charmosyna pulchella* (Gray)

Little Red Lory. Length 6½–7½ in. Adult male: head and neck all round red except for a black patch on nape; mantle green; lower back bluish black (sometimes green); tail-coverts green; central tail feathers green at base and terminal two-thirds red changing to yellow at tip; outer tail feathers broadly tipped yellow; underparts red except for some yellow streaks on mid-breast, black thighs and yellow undersurface of tail (in one subspecies a green patch on mid-breast as background for the yellow streaks, and thighs green with yellow streaks); under wing-coverts green and red; undersurface of wing quills plain greyish black; iris orange; bill red; feet orange; wing 93 mm, tail 100 mm, culmen from cere 15 mm, tarsus 11 mm. Female: like male but sides of rump yellow and green of breast more extensive.

RANGE Mid-mountain forests of New Guinea, from 2,500 to 6,500 ft.

SUBSPECIES Three:

a) *pulchella* (Gray); Vogelkop.
b) *bella* (De Vis); central ranges from Weyland Mountains to south-eastern New Guinea, also Huon Peninsula; very like *pulchella*.
c) *rothschildi* (Hartert); Cyclops Mountains and north slopes of mountains above the Idenburg River; like *pulchella* but with a wide green breast band or patch with yellow streaks and with blue-grey rump patch obscure or absent.

REMARKS This is often a rare bird of the treetops in mid-mountain forests, but on the slopes above the Idenburg River scores of them came in little squeaking flocks to feed on the flowers of tall forest trees in company with other *Charmosyna* and with many *Myzomela*.

***Charmosyna wilhelminae* (Meyer)**

Pygmy Streaked Lory. Length 4¼–5 in. Adult male: forehead yellowish green; centre of crown to nape purplish brown with bright blue streaks on nape; hind neck green with an olive wash in centre; mantle dark green; lower back red; rump dark purplish blue; longer tail-coverts green; tail quills dusky with concealed red in the base; side of head and underparts yellowish green, the breast with yellow, dusky-edged streaks; under wing-coverts red, undersurface of inner webs of quills red except at tips; iris yellow; bill dull red; feet greyish. Female: like male but no red in back and no red in under wing. Wing 67 mm, tail 50 mm, culmen from cere 11 mm, tarsus 9 mm.

RANGE Mountains of New Guinea from Arfak to south-eastern New Guinea and Huon Peninsula; from 1,600 to 5,800 ft.

REMARKS This seems a scarce bird that feeds in the flower trees of the mid-mountain forests.

***Charmosyna multistriata* (Rothschild)**

Yellow Streaked Lory. Length 7½ in. Adults: forehead yellowish green shading into green on top of head; hind crown and nape brown, the feathers of nape with dull orange spots at tips; rest of upperparts green, the tail more dusky olive and paling to whitish at tip; forepart of side of head yellowish green becoming dark green posteriorly and on side of neck where there are many bright green shaft streaks; upper throat yellowish green; lower throat to abdomen dark green, the feathers with narrow, pale yellow shaft streaks; under tail-coverts green with some semi-concealed red at the bases; underside of tail yellowish olive paler at tip and with some red towards the base; iris red; bill yellowish red; feet dark bluish grey. Wing 93–100 mm, tail 80 mm, culmen from cere 16 mm, tarsus 12 mm.

RANGE Southern slopes of the main ranges (Snow Mountains to upper Fly River), from 600 to 5,800 ft.

REMARKS This rare species is known from only a few localities.

***Charmosyna rubrigularis* (Sclater)**

Red-chinned Lory. Length 7–8 in. Adults: upperparts rather dark olive-green with tail feathers tipped yellow; side of head bluish green paler than crown, and with faint paler green shaft streaks to feathers; chin

and upper throat red; rest of underparts yellowish green considerably paler than back; undersurface of tail quills dusky (with concealed red at base) and broad yellow tips; undersurface of wing quills greyish black with a central band of yellow; under wing-coverts mostly yellowish green; iris orange; bill bright red; feet orange. Wing 95 mm, tail 94 mm, culmen from cere 13 mm, tarsus 12 mm.

RANGE Bismarck Archipelago and Karkar Island west of Astrolabe Bay.

SUBSPECIES IN NEW GUINEA One, *krakari* (Rothschild and Hartert); Karkar Island.

### *Charmosyna rubronotata* (Wallace)

Red-fronted Blue-eared Lory. Length 6–7 in. Adult male: forehead and forecrown red; rest of upperparts dark green except for some red feathers in upper tail-coverts and dusky tail quills, the outer ones tipped yellow; lower side of head pale yellowish green, ear patch blue with obscure shiny shaft streaks to the feathers; underparts pale yellowish green except for a patch of red on each side of forebreast which extends on to under wing-coverts, undersurface of wing quills which are greyish black with an obscure yellow bar in mid-wing and underside of tail quills which are broadly yellow at tip (except central pair) dusky centrally, and concealed bases with much red; iris orange; bill red; feet dull red; wing 85 mm, tail 75 mm, culmen from cere 12 mm, tarsus 11 mm. Female: like male but no red in forehead; ear patch green with some yellow streaks; red of breast and under wing-coverts replaced by yellowish green.

RANGE Salawati, Vogelkop and northern New Guinea east to Sepik River, also Biak Island in Geelvink Bay; lowlands up to 2,700 ft.

SUBSPECIES Two:

a) *rubronotata* (Wallace); Salawati, Vogelkop and northern New Guinea east to Sepik River.
b) *kordoana* (Meyer); Biak Island; like *rubronotata* but red of crown paler and more extensive and ear patch bluer, less purplish.

REMARKS This species feeds in the tops of tall flowering trees in the forest. It is said that small chattering bands also feed among the tall coconut trees in coastal villages.

### *Charmosyna placentis* (Temminck)

Yellow-fronted Blue-eared Lory. Length 6–7 in., with long, pointed tail. Adult male: forehead and forecrown yellow or yellowish green; rest of upperparts green except for blue rump patch in some subspecies; and yellow and red in tail tip; side of face back to eye red; ear-coverts blue;

sides of neck green; underparts yellowish green except for red chin and red patches from sides of breast to flanks, and for tail which is red and yellow with a black central band; under wing greyish black with a yellow bar on quills and with under wing-coverts with red; iris red or orange; bill red; cere and feet dull red; wing 88 mm, tail 70 mm, culmen from cere 12 mm, tarsus 12 mm. Female: like male but forehead and crown green like back; red of male replaced with light green like rest of underparts, and ear patch heavily streaked yellow; wing 86 mm.

RANGE Moluccas to New Guinea and some satellite islands, Bismarck Archipelago and Solomon Islands; lowlands.

SUBSPECIES IN NEW GUINEA Four:

a) *ornata* (Mayr); western Papuan Islands and Vogelkop; wing 91–95 mm; rump patch blue in both sexes.
b) *placentis* (Temminck); Southeast Islands, Kei Islands, Aru Islands and south New Guinea (Utanata River to Fly River area); like *ornata* but blue rump spot much smaller, crown less yellowish, red of chin and throat less extensive and reddish yellow on tip of central tail feathers wider; wing 82–89 mm.
c) *subplacens* (Sclater); eastern New Guinea, west in south to Hall Sound and on the north to Sepik River and near Sarmi (Ripley); like *placentis* but rump green without a large blue spot.
d) *pallidior* (Rothschild and Hartert); Woodlark Island east of New Guinea, also Bismarck Archipelago and Solomon Islands; like *subplacens* but upperparts paler green, and ear-coverts lighter blue.

NESTING On the middle Fly River a pair was found excavating a tunnel in a large arboreal termite mound in a tea tree swamp, probably for a nest.

REMARKS This species is found both in savannah and forest; it is usually uncommon, quiet and inconspicuous. Birds were most often seen in pairs, occasionally in small parties and they are said to visit flower trees for nectar.

### *Oreopsittacus arfaki* (Meyer)

Plum-faced Mountain Lory. Length 6–7 in. Adult male: forehead and crown red; nape to upper tail-coverts dark green; central tail feathers green basally changing to black and broadly tipped red; outer tail feathers black broadly tipped red; upper wing-coverts like back; remiges dusky, inner ones edged green, outer ones blue except at tips and whole outer quill which are black; lower part of face deep blue with an irregular white streak from bill to below eye and to ear-coverts; underparts green with or without an orange patch on abdomen; some under tail-coverts edged yellow; a red patch on side of body under the

wing extending on to the under wing-coverts; rest of under wing blackish with a conspicuous yellow bar in mid-wing; undersurface of tail quills black with broad red tips sometimes edged black; iris grey or brown; bill black; feet grey; wing 84 (73–91) mm, tail 70 mm, culmen from cere 12 mm, tarsus 9 mm. Female: like male but with red of head replaced by green.

RANGE Vogelkop and central ranges east to Huon Peninsula and south-eastern New Guinea; 6,500 to 12,000 ft.

SUBSPECIES Three:

a) *arfaki* (Meyer); Vogelkop; wing 73–76 mm.
b) *major* (Ogilvie-Grant); Snow Mountains; like *arfaki* but larger, wing 83–91 mm.
c) *grandis* (Ogilvie-Grant); Sepik Mountains area to mountain region of south-eastern New Guinea and Huon Peninsula; like *major* but lacks red patch on abdomen.

REMARKS In the high altitude mountain-forests this lory was common and often seen in pairs, sometimes in small parties. It fed not only in the tops of the high flowering trees along with other birds, but also on small fruits on lower trees within the forest. It was often active, walking about on small branches and twigs, reaching out here and there to the centre of flowers and swinging around and clinging upside down to the underside of twigs. A single bird was seen walking about whistling to itself and bobbing its head and body. The species was rather quiet, only occasionally giving little squeaking calls though like other lories the rapid wing-beats during swift, straight flight produced a whistling sound.

### Key to *Neopsittacus* Species

1 Bill yellow; undersurface of tail light yellow: *N. musschenbroekii.*
2 Bill orange; undersurface of tail orange and green: *N. pullicauda.*

### *Neopsittacus musschenbroekii* (Schlegel)

Yellow-billed Mountain Lory. Length 7½–9 in. Adults: forehead light green changing to olive-brown on hind crown and back of neck, the feathers of hind crown and nape with yellowish shaft streaks; rest of upperparts dark green except for outer tail feathers which are broadly tipped yellow and with much red basally; side of head green plentifully streaked with yellow-green; underparts: throat, breast and centre of abdomen red, sides of neck and lower breast and abdomen green; under tail-coverts mixed pale yellow-green and orange; tail below yellow washed with orange-red basally; under wing (coverts and undersurface of quills, except tip) mostly red; iris red; bill yellow; feet grey. Wing 116 (106–24) mm, tail 90 mm, culmen from cere 16 mm, tarsus 13 mm.

In some specimens the red of breast is restricted to the tips of the feathers so that much green shows through.

RANGE Vogelkop, central ranges and Huon Peninsula to south-eastern New Guinea; mountains from 5,700 to 7,700 ft.

SUBSPECIES Three similar ones:

a) *musschenbroekii* (Schlegel); Vogelkop; pale streaks of cheeks green; wings 106–15 mm.
b) *medius* (Stresemann); Snow Mountains; like *musschenbroekii* but larger and colour of streaks on cheeks intermediate between *musschenbroekii* and *major*; wing 113–24 mm.
c) *major* (Neumann); Sepik area, Huon Peninsula, and south-eastern New Guinea; like *medius* but pale streaks of cheeks olive-yellow less green; general colour paler; wing 114–23 mm.

REMARKS See under next species.

***Neopsittacus pullicauda* (Hartert)**

Orange-billed Mountain Lory. Length 7–8 in. Very similar to the preceding species *N. musschenbroekii* but smaller with smaller bill, hind crown and nape dark brownish green with only an indication of pale shaft streaks and thus contrasting little with rest of upperparts; upperparts darker green; lower part of side of head much darker green; tail quills olive-green with bases with much red; bill red. Wing 100–12 mm.

RANGE Snow Mountains to south-eastern New Guinea and Huon Peninsula, from 7,600 to 12,000 ft.

SUBSPECIES Three similar ones:

a) *alpinus* (Ogilvie-Grant); Snow Mountains east to mountains at head of Fly River; orange-red of breast contrasts with the dark red of abdomen.
b) *socialis* (Mayr); Huon Peninsula and Herzog Mountains; like *alpinus* but breast red like abdomen.
c) *pullicauda* (Hartert); Sepik mountains area to south-eastern New Guinea; like *socialis* but upperparts paler, the brownish green area on hind neck of greater extent, and sides of body paler green.

REMARKS The species *pullicauda* is a high mountain bird, the very similar *musschenbroekii* is a mid-mountain bird, but their altitudinal ranges overlap broadly and they may be found in the same forests. It is worth noting that over most of the New Guinea mountains where both occur the higher altitude species is smaller, but in the Vogelkop where only the lower altitude species occurs it is also small. Though these two species are much alike in appearance and in habits, they are easily told apart in life by the yellow bill and light yellow undersurface of the

tail of *musschenbroekii*, and the orange bill and the orange and green tail of *pullicauda*.

Both species are common birds, conspicuous and easily watched, and the shrill squeaks of small parties in flight are characteristic sounds of the forests. Both species are adaptable, feeding in flowering trees and also eating small fruits and seeds, taken from the tops of both the high and low trees. Though numbers gather at favourite feeding places along with other species, they usually arrive and leave in small parties.

### Key to *Psittaculirostris* and *Opopsitta* Species

1 Forehead black to dark blue; a blackish to dark blue patch bordered with whitish on side of head: *O. guilielmi III.*
Not so: 2.

2 Breast and abdomen green with a yellow streak on each flank: *O. diophthalma.*
Not so: 3.

3 (a) Forehead, crown and side of head red-orange to yellow: *P. desmarestii* (part).
(b) Forehead red, crown yellow, side of head orange to green with a blue spot below eye: *P. desmarestii* (part).
(c) Forehead and forecrown green, side of head red and yellow or orange: 4.

4 Nape black and grey: *P. edwardsii.*
Nape golden-yellow like face: *P. salvadorii.*

### *Psittaculirostris desmarestii* (Desmarest)

Large Fig Parrot. Length 7–7½ in. Small green parrots with much orange and red in head, heavy bill, and short pointed tail. Adults: colour of head varies with subspecies; forehead red changing to orange or yellow on crown; nape and hind neck orange, yellow, green, or blue; side of head orange or green with or without feathers being narrow and lengthened and with or without a blue spot below the eye; underparts yellowish green except for a blue band on upper breast, sometimes followed by a red-brown one; blue areas on sides of breast; under wing-coverts green and wing quills dusky with yellow margins basally on some of the inner webs; back, rump and tail dark green; the inner greater wing-coverts with some concealed red; wing quills edged with bluish green basally and yellow distally; iris brown; bill black; feet grey. Wing 110 mm, tail 57 mm, culmen from cere 19 mm, tarsus 16 mm.

RANGE Western Papuan Islands of Salawati, Batanta, Misol and New Guinea lowlands except the north where two closely related species replace it; lowlands, occasionally up to 2,500 ft.

SUBSPECIES Five, some quite distinct in head colour:

a) *desmarestii* (Desmarest); eastern part of Vogelkop and Onin Peninsula; forehead red changing to orange-yellow on crown and nape; hind neck green, cheeks green with bright blue spot below eye; red-brown breast band behind blue one.

b) *occidentalis* (Salvadori); Salawati, Batanta, and western part of Vogelkop; like *desmarestii* but cheeks and ear-coverts orange instead of yellow-green; blue spot below eye paler.

c) *blythi* (Wallace); Misol; like *occidentalis* but cheeks brighter orange and no blue spot below eye.

d) *godmani* (Ogilvie-Grant); south New Guinea from Mimika River east to intergrade (or hybridize) with *cervicalis* in Fly River area; like *blythi* but crown and nape orange-red and a conspicuously contrasting yellow band on hind neck; also cheek feathers more elongated, and narrow, forming a ruff; no distinct red-brown breast band back of dark blue one.

e) *cervicalis* (Salvadori and D'Albertis); eastern New Guinea, west on south to Fly River and Noord River (where hybridizes with *godmani*) and on north to Kumisi River; like *godmani* but nape and hind neck blue (green in immatures); breast band darker blue, and breast more or less washed orange buff.

NESTING Several pairs of birds seen going into the many large cavities in the trunk of a large gnarled forest tree suggested colonial nesting in such a site.

REMARKS This seems to be an uncommon bird, or one which is at least local in distribution. On one occasion several birds were seen feeding on a fruit high in a forest tree. Another record is of small flocks seen in fig trees.

### *Psittaculirostris salvadorii* (Oustalet)

Salvadori's Fig Parrot. Length 7–8 in. Adult male: forehead bluish green; crown green; nape and cheeks golden-yellow, the feathers of cheeks long and narrow and with a blue spot behind eye; rest of upperparts green; breast red; rest of underparts green; wing 106 mm, tail 90 mm, bill 18 mm (ex Salvadori). Female: green, paler below and with crown streaked blue; feathers of cheeks yellowish and very long and narrow; a spot behind eye blue; hind neck yellowish green; breast with a broad pale greenish band and sides of breast tinged orange-brown; under wing-coverts pale green; wing quills above green, below dusky with yellow edging to inner webs on basal portion; longer inner upper wing-coverts with concealed orange; bill black; feet grey (ex Salvadori).

RANGE North New Guinea from Geelvink Bay to Humboldt Bay.

REMARKS One of the rare New Guinea birds. Rare at least in collections.

***Psittaculirostris edwardsii* (Oustalet)**

Edward's Fig Parrot. Length 7 in. Adult male: forehead and crown yellowish green, changing to olive-brown on hind crown and bordered posteriorly by a black band that runs to eyes; lower cheeks red, upper cheeks yellow with feathers narrow and elongate and mixed with some red and some blue ones; back, rump and tail dark green with some concealed red in inner greater wing-coverts, and wing quills black edged with blue-green becoming yellowish near tips of outer ones; throat and centre of breast and abdomen red with a narrow blue-black breast band across the red; sides of breast, flanks, thighs and under tail-coverts green. Female: like male but red throat bordered posteriorly by a moderately wide dark blue breast band, and rest of underparts green paling to yellowish green on middle of breast on which there may be a trace of red; iris brown to red-brown; bill black; feet dark grey. Wing 114 mm, tail 56 mm, culmen from cere 19 mm, tarsus 17 mm.

RANGE North New Guinea from Humboldt Bay to Huon Gulf; lowlands.

REMARKS This beautiful little parrot with golden cheek feathers which spread out backwards, fan-like, is uncommon. In the foothills of the Finisterre Mountains, several solitary birds came to feed in the top of a fruit-laden tree. Each parrot moved quickly through the outer branches of the crown of the tree, often hanging upside down to reach clusters of the green fruit.

***Opopsitta gulielmi* III (Schlegel)**

William's Fig Parrot. Length 4½–5 in. A very short-tailed, small parrot, mostly green, with a light and dark pattern on side of head. Adult male: forehead and forecrown dark brown, black or blue; rest of upperparts dark green except for some semi-concealed yellow in inner secondaries and for outer flight quills which are black edged with blue; side of head pale yellow with a large black or blue spot below eye; throat pale yellow; breast orange; abdomen pale green; under wing with green coverts except near bend of wing where blue, and wing quills usually with some yellow on inner margins. Female: like male but breast yellowish orange to greenish; side of head back of black spot orange and sides of throat with some bluish. Iris brown; bill black; feet grey. Wing 82 (73–98) mm, tail 34 mm, culmen from cere 14 mm, tarsus 13 mm.

RANGE Salawati and Aru Islands and New Guinea lowlands, forest and savannah.

SUBSPECIES Seven: differing chiefly in colour of forecrown, presence or absence of yellow in under wing, and size.

a) *gulielmi III* (Schlegel); Salawati and western part of Vogelkop; a large form with forepart of top of head deep blue and no yellow in inner edges of base of wing quills; wing 98 mm.
b) *nigrifrons* (Reichenow); northern New Guinea from Mamberamo to Sepik Rivers; like *gulielmi* but forepart of top of head black and smaller; wing 90 mm.
c) *ramuensis* (Neumann); northern New Guinea in Ramu River area; intermediate between *nigrifrons* and *amabilis*.
d) *amabilis* (Reichenow); north-eastern New Guinea from Huon Peninsula to Milne Bay; like *nigrifrons* but forepart of top of head bluish black; and smaller, wing 80 mm.
e) *suavissima* (Sclater); south coast of south-eastern New Guinea west to Gulf of Papua; like *amabilis* but forepart of top of head deep blue; and yellow edgings to inner webs of wing quills at base; wing 80 mm.
f) *fuscifrons* (Salvadori); southern New Guinea from Fly to Mimika Rivers; forepart of top of head dark brown; yellow in inner webs of wing quills at base; wing 76 mm.
g) *melanogenia* (Schlegel); Aru Islands; like *fuscifrons* but female with paler, more greenish breast; wing 80 mm.

REMARKS Some races of this little parrot were not uncommon, for example in the Fly River area, but others seem very rare and seldom reported.

### *Opopsitta diophthalma* (Hombron and Jacquinot)

Two-eyed Fig Parrot. Length 5½–6½ in. A small green parrot with short pointed tail; some races with much red in head. Adult male: colour of head varies with subspecies; forehead and forepart of crown red or blue with a red central spot; side of head mostly red with some blue and green or just green; hind part of crown green; rest of upperparts green (sometimes washed olive) except for more or less concealed red in inner wing quills and black, blue-edged outer wing quills; throat green edged with blue or green; rest of underparts green paler than back, except for a variable amount of yellow in flanks; under wing-coverts partly green; underside of wing quills dusky with some yellow edgings near base; iris brown; bill slaty grey, darker towards tip; feet grey; wing 87 mm, tail 48 mm, culmen from cere 14 mm, tarsus 13 mm. Female: like male or with less red or no red and more blue in head (see under subspecies).

RANGE Western Papuan Islands, all New Guinea lowlands, Aru Islands, D'Entrecasteaux Archipelago, in Louisiade Archipelago and north Queensland; lowland forest, occasionally to 5,000 ft.

SUBSPECIES IN NEW GUINEA Four:

a) *diophthalma* (Hombron and Jacquinot); western Papuan Islands and New Guinea except the south. Male: forehead red; forecrown red changing to yellow posteriorly; a light blue spot in front and above eye changing to a green band over eye; lower part of side of head orange-red with some elongated feathers below eye, and the red margined with blue posteriorly. Female: like male or part of side of head buffy instead of red.

b) *aruensis* (Schlegel); Aru Islands and southern New Guinea from Mimika River to Fly River; male like *diophthalma* but less yellow in crown; female quite different, with red in head of male replaced with blue, and some buffy in cheeks.

c) *virago* (Hartert); D'Entrecasteaux Archipelago on Fergusson and Goodenough Islands; male like *aruensis* but red of head of lesser extent; female with red areas of male replaced by blue except for small red patch in centre of forehead.

d) *inseparabilis* (Hartert); Tagula (Sudest) Island, Louisiade Archipelago; male and female like female of *virago* but side of head green, not blue.

NESTING [In a hole in a tree; eggs three to four, white. Australian data.]

REMARKS Evidently this is one of the rarer, lesser known parrots. In Australia it is said to be inconspicuous and to feed on figs.

### Key to *Micropsitta* (Pygmy Parrots) Species

1 With some red in underparts: 2.
No red in underparts: 3.

2 Hind neck blue; under tail-coverts red: *M. bruijnii* (male).
Hind neck green; under tail-coverts green and yellow: *M. keiensis* (male) (part).

3 Crown with blue: 4.
Crown without blue: 5.

4 (a) Blue crown spot separated from eye by a yellowish or buffy stripe; rest of side of face buff: *M. pusio.*
(b) Blue of crown bright and reaching eye; forepart of face pinkish buff: *M. bruijnii* (female).
(c) Dull blue crown spot; whole side of head dusky (Geelvink Bay islands only): *M. geelvinkiana* (part).

5 Crown dusky with yellow spot on nape: *M. geelvinkiana* (part).
Crown yellow or yellow green: *M. keiensis.*

### *Micropsitta keiensis* (Salvadori)

Yellow-capped Pygmy Parrot. Length 3½ in. Adult male: crown yellow (forehead sometimes dusky); rest of upperparts green (many of the

back feathers often with narrow dusky margins and upper wing-coverts with black centres) except for central tail quills which are blue and outer ones which are mostly black with a yellow spot in tip, and wing quills which are black with narrow green margins; sides of head dark brown to buffy; underside green (with or without narrow dusky margins) to yellowish green with, in one subspecies, red in centre of breast and abdomen; iris brown; bill and feet dark grey; wing 65 (58–65) mm, tail 25 mm, culmen from cere 8 mm, tarsus 8 mm. Female: like male but never with red; cheeks paler and size slightly smaller.

RANGE Western Papuan Islands, Kei and Aru Islands, western New Guinea (Arfak and Onin Peninsulas) and southern New Guinea (Mimika River to Fly River); in lowlands.

SUBSPECIES Three:

a) *chloroxantha* (Oberholser); western Papuan Islands and north-western New Guinea (Vogelkop and Onin Peninsula); male with red in centre of breast and abdomen and rest of underparts yellowish green.
b) *keiensis* (Salvadori); Kei and Aru Islands; with no red in plumage; green of underparts darker.
c) *viridipectus* (Rothschild); southern New Guinea from Mimika to Fly Rivers; very like *keiensis*.

NESTING Dr Bergman found a nest excavated in a termite mound about twelve feet up on the trunk of a forest tree. The narrow entrance tunnel led up and into the top of the roomy nest chamber which had no lining; it contained two young of different sizes and some broken white egg-shells. This nest, collected at night, also contained six adults; in another similar 'nest', but with two white eggs, six adults were also found to spend the night. In yet another similar nest with neither eggs nor young, three full-grown birds spent the night. Apparently the male bird feeds the incubating female at long intervals (see *Aviculture Magazine* (1960), *66*, pp. 209–15, for further details). Perhaps a number of birds are 'helpers at the nest'.

REMARKS Dr Bergman, observing these birds both in the wild and in cages in New Guinea, reported that they climb on tree trunks in the forest using their stiff, spine-tipped tails as do woodpeckers. They sometimes cling head downward on the trunk. Though he kept several caged he was unable to find a satisfactory food for them. Despite native information they ate very few of the termites provided. However, he saw one bird in the forest that 'kept scraping her bill along the bark almost as though she was going to eat it', and in 1902, O. Heinroth wrote 'this species lives on a substance on the tree bark'. Dr Bergman also found the crops of some birds to be filled with an 'indeterminate

white mass'. Probably they, like the red-bellied pygmy parrots, eat fungus and perhaps algae from the bark.

### *Micropsitta geelvinkiana* (Schlegel)

Geelvink Bay Pygmy Parrot. Length 3½ in. Adult male: head colour varies with subspecies; dusky brown all round with a yellow spot on nape and a scarcely perceptible bluish collar around neck or head all round dark dusky with a dull blue spot in centre of crown and no blue collar; rest of upperparts green (some feathers with narrow dusky edges and upper wing-coverts with conspicuous black centres) except for central tail feathers which are mostly blue and outer ones which are black with yellow spots in tips, and wing quills which are black edged with green; underparts green with more or less ochre-yellow in middle of breast and abdomen and under tail-coverts mostly yellow; iris red-brown or orange; bill and feet grey; wing 58 (54–60) mm, tail 30 mm, culmen from cere 8 mm, tarsus 8 mm. Female: like male but in both subspecies head brown with crown feathers edged blue and cheeks tinged blue; middle of underparts greenish yellow; and slightly smaller.

SUBSPECIES Two:

a) *geelvinkiana* (Schlegel); Numfor Island; male and female with blue in crown; wing 54–59 mm.
b) *misoriensis* (Salvadori); Biak Island; male without blue in crown.

REMARKS So far as is known, the three species of lowland pygmy parrots are geographical representatives. The fourth is a mountain bird.

### *Micropsitta pusio* (Sclater)

Buffy-faced Pygmy Parrot. Length 3–3½ in. Adult male: forehead buffy brown, joining the same colour of side of head; a blue patch on centre of crown; rest of upperparts green (many feathers with narrow dusky edgings and lesser upper wing-coverts with dark centres) except for central tail quills which are mostly blue and outer ones which are black with yellow spots in tips, and wing quills which are black with green outer margins; side of face buffy brown to buffy, often with superciliary stripe brighter or more yellowish buffy; underparts green, more yellowish along midline (some feathers with narrow dusky edgings) except for under tail-coverts which are yellow; iris brown; bill dark grey; cere flesh-colour; feet dark pinkish or grey; wing 65 (60–70) mm, tail 25 mm, culmen from cere 7 mm, tarsus 7 mm. Female: similar, slightly duller and smaller.

RANGE Northern (to west coast of Geelvink Bay) and south-eastern New Guinea (west to Angabunga River), some eastern Papuan Islands, and in Bismarck Archipelago; in lowlands up to 1,300 ft.

SUBSPECIES Four very similar ones:

a) *beccarii* (Salvadori); northern New Guinea from west coast of Geelvink Bay to Kumusi River, also Manam, Karkar and Rook Islands; side of head dark brown.

b) *pusio* (Sclater); south-eastern New Guinea from Milne Bay to Angabunga River, also in Bismarck Archipelago; like *beccarii* but side of head paler.

c) *harterti* (Mayr); Fergusson Island in D'Entrecasteaux Archipelago; like *pusio* but underparts more yellowish green; male wing 62–64 mm.

d) *stresemanni* (Hartert); Misima and Tagula Islands, Louisiade Archipelago; like *harterti* but larger, wing 69 mm.

NESTING Natives say that this species excavates a nest hole in arboreal termite mounds. This seems a reasonable observation.

### *Micropsitta bruijnii* (Salvadori)

Red-breasted Pygmy Parrot. Length 3½ in. Adult male: crown buffy red; nape and hind neck deep blue; rest of upperparts dark green many of the feathers narrowly edged with black, except for wing-coverts which are black edged green, wing quills which are black, and tail quills of which the central ones are blue, the outer ones black with buffy orange tips; side of head with a dark blue band joining blue nape and with lower side of head and throat buffy orange; side of neck green with blue collar which crosses lower throat; middle of breast and abdomen and under tail-coverts pale red; sides of breast and abdomen green; under-surface of tail quills black with orange tips on lateral ones; under wing dusky grey. Female: like male but whole crown to eye blue (a little buffy in forehead) forepart of side of head and upper throat buffy orange; posterior side of head and back and sides of neck green; lower throat bluish white and rest of underparts green, more yellowish along midline; spots in tip of tail yellow. Wing 68 mm, tail 25 mm, culmen from cere 7 mm, tarsus 9 mm. Immature males: more like females but with orange on breast and abdomen.

RANGE Mountains in Moluccas and New Guinea, Bismarck Archipelago and Solomon Islands.

SUBSPECIES IN NEW GUINEA One, *bruijnii* (Salvadori); widespread in New Guinea in mountains between 1,600 and 7,500 ft, but apparently local in occurrence and abundance.

NESTING A hole had been excavated by the bird in the dead trunk of a forest tree. The cavity was about ten feet from the ground. The entrance and tunnel were just big enough to admit a bird and opened into a roomy nest chamber also made by the bird. The floor was littered with

fragments. The nest chamber was directly above the entrance and the tunnel led in, then up, and entered the chamber from the back near the top. This is an unusual arrangement. There were two young with scanty yellowish white natal down.

A male was discovered excavating a similar nest which he apparently used as a sleeping place.

REMARKS Though we found the bird at only three localities, once in tall mountain forest at 5,760 ft, it was fairly common. During the breeding season in January, it was usually found in pairs climbing about the trunks of trees, especially dead, rotting ones, and occasionally giving a fine high squeak. It rarely climbed head down but crept across and up the big trunks with facility. It was difficult to discover what the food might be. The stomach contents always consisted of a white paste in which neither animal nor vegetable material could be identified even with a 20 × lens. Finally, however, we noted the resemblance of this paste to the white jelly-like layers of a fungus common on rotting wood; then we saw the birds actually nibbling at these fungi, and later saw their beak marks in the fungus layers. It appeared that here these birds fed largely on the fungus, though native information elsewhere was that the birds bored into termite nests to feed on the termites.

An adult, caught alive at a nest, was kept in a cage for a short time. It was a nervous, active bird, continually worrying at the wire and wood of the cage. It climbed with two toes in front and two behind, and seemed to prefer to cling and climb sideways on a vertical surface and it did not use its spine-tipped tail as a prop. It continually bit off pieces of rotten wood put into its cage but apparently ate none of the fungus supplied.

### *Probosciger aterrimus* (Gmelin)

**Palm Cockatoo.** Length 20–25 in. Adult male: generally black or greyish black with an enormous bill, a patch of bare pink or red skin between eye and bill, and a long (up to 6 in.) crest of narrow feathers rising on crown; iris brown; bill black; feet black; wing 350 mm (310–400 according to subspecies), tail 225 mm, culmen from cere 80 mm, tarsus 30 mm. Female: like male but averages smaller. Immatures: like adult except occasionally has tip of bill white and black feathers of breast and abdomen with scattered, narrow irregular yellow bars.

RANGE Western Papuan Islands, Aru Islands, Biak Island, and New Guinea; generally in lowlands, up to 4,000 ft and occasionally higher; also Cape York, Australia.

SUBSPECIES Five:

a) *intermedius* (Schlegel); Aru Islands; the smallest race, wing 310–57 mm.

b) *alecto* (Temminck); western Papuan Islands; plumage greyish black; size small, wing 335–82 mm; immature birds have tip of bill white and some pale barring of underparts.
c) *goliath* (Kuhl); western and southern New Guinea, east on north to Geelvink Bay, on south to Milne Bay except coastal areas of central southern New Guinea; plumage greyish black; size large, wing 375–400 mm.
d) *aterrimus* (Gmelin); Cape York Peninsula and coastal area of south New Guinea, from Merauke (possibly Noord River) to Oriomo River; like *goliath* but blacker and smaller, wing 335–68 mm.
e) *stenolophus* (van Oort); Japen Island and northern New Guinea from Mamberamo River to Collingwood Bay area; like *goliath* but crest feathers of adults much narrower; wing 355–95 mm; the most distinct subspecies.

NESTING [A high hole in a tree said to be lined with sticks. A single egg, white; size 40 × 53 mm. Australian data.]

REMARKS Though seldom very common these great black birds are conspicuous. Singly, in pairs or small parties, they perch in treetops in the forest or in the denser savannah, or fly through the forest and give loud whistled calls. On one occasion what seemed to be a display was observed. Three birds were sitting in an exposed treetop and two of them with erected crests were giving loud harsh screams, the other spread its wings, also screaming.

The birds are usually seen in the treetops; occasionally they come to the ground in the forest, possibly to feed on fallen fruits, and sometimes to shell and eat the small seeds of a sedge. It is surprising that birds with such large bills should eat such small items.

### Genus *Cacatua*

The two members of this genus are the only white parrots in New Guinea.

### Key to *Cacatua* Species

With a recurved, yellow crest: *C. galerita.*
With a full crest of white feathers: *C. sanguinea.*

### *Cacatua galerita* (Latham)

also known as *Kakatoe galerita*

White Cockatoo. Length 15–20 in. Adults: a long (4–5 in.), yellow, recurved crest; otherwise plumage white with a yellowish or pinkish tinge especially on under wing and underside of tail; iris brown; bare skin around eye pale blue-grey; bill black; feet black. Wing 310 (270–355) mm, tail 190 mm, culmen from cere 45 mm, tarsus 27 mm.

RANGE Ceram Laut, New Guinea and satellite islands (western Papuan Islands, Aru Islands, islands in Geelvink Bay, eastern Papuan Islands), Bismarck Archipelago and Australia; lowlands to 4,500 ft.

SUBSPECIES IN NEW GUINEA One, *triton* (Temminck); all New Guinea area, within which populations of different sizes occur in random patterns; size also increases with altitude. On some mountain slopes, above the Idenburg River, males from 160 ft had wing measurements of 302–6 mm, from 3,800 ft these increased to 335–51 mm.
NESTING In a natural cavity in a savannah or forest tree. [Eggs two, white. Australian data.]

REMARKS The white cockatoo was a bold, conspicuous bird, often seen in parties of three or four flying over the forest or perched in the tree-tops, attracting attention by harsh cries. In the savannah country, where it was fairly common, the bird sometimes fed on the ground where its feathers became stained from contact with the soil. In Australia, the food is recorded as a wide variety of seeds, including cultivated grasses, and roots grubbed from the soil.

***Cacatua sanguinea* (Gould)**
also known as *Kakatoe sanguinea*
Little Corella Cockatoo. Length 18 in. Adult plumage: white tinged with yellow on underside of wing and tail; concealed bases of feathers of head and neck salmon-red; some red in area between eye and bill; the moderate crest is short, straight and full; iris brown to red-brown, bare skin round eye blue; bill and feet blue-white. Wing 270 mm, tail 130 mm, culmen from cere 31 mm, tarsus 25 mm.

RANGE Australia, Tenimber Islands, and one recorded in 1958 in the Merauke area of south New Guinea.

NESTING [In a hole in tree or cliff; eggs three, white. Australian data.]

***Psittrichas fulgidus* (Lesson)**
Vulturine Parrot. Length 18 in. Adult male: head scantily covered with small bristly dark feathers and a red patch back of eye; upperparts black (feathers of black with obscure pale margins) except for upper tail-coverts, the outer upper wing-coverts, and the outer webs of several central flight quills which are red; underparts: throat and breast black, each feather with a pale grey-brown tip; abdomen, flanks, and under tail-coverts red; undersurface of tail black; under wing black with red in coverts; iris brown; bill and skin of head black; feet black; wing 314 (273–337) mm, tail 191 mm, culmen from cere 41 mm, tarsus 28 mm. Female: like male but without red in side of head, and smaller on average.

RANGE New Guinea forests from 2,500 to 4,000 ft, occasionally common to sea level at foot of mountains.

SUBSPECIES None recognizable despite considerable geographical variation in size in an irregular pattern.

REMARKS In some localities the vulturine parrot is common and rather conspicuous. The birds are seen singly, in pairs, or small parties in the treetops or flying over the forest. The outline in flight: short tail, broad wings and long slender outstretched head and neck; the short, quick wing-beats occasionally interrupted with short glides; and the call, a hoarse 'aaar' or 'caar', sometimes uttered continuously while on the wing, are all very distinctive.

The birds feed occasionally on large flowers, but more often on figs and the soft pulp of other tree fruits. Birds collected usually had the area about the base of the bill caked with fruit pulp and the reduction of feathering on the head may have evolved to avoid the plumage becoming matted with food. This would seem to correspond in function with the bare heads of vultures. A captive bird was heard to say a few words.

***Larius roratus* (Müller)**

also known as *Eclectus* or *Lorius roratus*

Red-sided Eclectus Parrot. Length 15 in. Adult male: upperparts green except for a little pale blue at bend of wing, blue-black wing quills, the inner ones broadly, the outer ones narrowly edged green except at tip, and mostly blue, more or less green edged, yellow tipped, outer tail quills; sides of head and underparts green except for sides of body and smaller under wing-coverts which are red, underside of wing quills which are black, and underside of tail which is black tipped with yellow; iris orange-red; bill with maxilla orange-red and tip yellowish; mandible black; feet black; wing 215–69 mm, tail 145 mm, culmen from cere 40 mm, tarsus 40 mm. Female: top and sides of head and neck bright red; a collar across base of hind neck blue; rest of upperparts dark red except for bend of wing which is blue, outer wing quills which are blue-black and central ones which are dark red, green and blue, tip of tail which is light red and sides of tail which are dusky green at base; throat and breast red like side of head; abdomen and sides of body blue; thighs dark red; under tail-coverts red; underside of tail dull red, the outer quills dusky at base; iris brown, whitish brown, yellow or white; bill black; feet black; on average slightly smaller than male.

RANGE Lesser Sunda Islands (part), Moluccas, New Guinea and satellite islands, northern Queensland, Bismarck Archipelago and Solomon Islands; lowlands to 3,000 ft.

SUBSPECIES IN NEW GUINEA Four recognized, all very similar (some need to be confirmed):

a) *pectoralis* (Müller); Southeast Islands (introduced), Kei Islands, western Papuan Islands, New Guinea, Japen and Meos Num in Geelvink Bay, and eastern Papuan Islands; male wing 257–69 mm, female wing 237–49 mm (north New Guinea); male wing 247–65 mm, female wing 239–50 mm (south New Guinea).
b) *aruensis* (Gray); Aru Islands; very like *pectoralis*.
c) *maforensis* (Rothschild); Numfor Island in Geelvink Bay; doubtfully distinct from *pectoralis*.
d) *biaki* (Hartert); Biak Island in Geelvink Bay; like *pectoralis* but smaller, wing 215–46 mm.

NESTING Nest built high above the ground in a natural hollow in a tree; eggs two, white, broadly ovate; size 42 × 31 mm (one record). (In captivity incubation undertaken by female for estimated six to seven weeks; female rarely leaves nest, being fed by male; young in nest grow to three to three and a half months as male continues to feed female who then gives food to young, but in latter part of the period also seeks food for herself.)

REMARKS The red-sided eclectus is a bird found in the treetops of the forest and in the denser tall savannah. It is sometimes fairly common and it is always conspicuous, perching and walking in a clubfoot slow way in the tops of the tall trees and flying about, often two or three together, giving harsh cries. When we travelled up the Oriomo River these birds were often startled from the forest and would fly about, quite high, screaming as if scolding. Once in the Finisterre Mountains, a flock of ten birds flew over the lowland forest, screaming, apparently bound for a roosting area.

### Key to *Geoffroyus* Species

1 (a) Head pinkish red and blue: *G. geoffroyi* (male).
  (b) Head red-brown to olive-brown: *G. geoffroyi* (female, part).
  (c) Head green like body with at most a faint pattern not visible at a little distance: 2.
2 (a) Head and neck green with a faint grey-blue ring round neck: *G. simplex* (male).
  (b) Head and neck green with a faint blue wash on crown: *G. simplex* (female).
  (c) Head and neck green with a faint olive-brown wash on side of head (Sudest Island only): *G. geoffroyi* (female, part).

### *Geoffroyus geoffroyi* (Bechstein)

Red-cheeked Parrot. Length 8–10 in. Adult male: forehead red; crown

and nape (sometimes hind neck) blue; rest of upperparts green (except sometimes for dark red rump patch and rust or red-brown patch in lesser upper wing-coverts and centre of back washed olive or golden); side of head pinkish red more or less washed bluish; chin and throat like side of head; breast to underside of tail green; under wing-coverts and axillaries blue; rest of under wing dusky black; iris white or yellowish; bill, maxilla red-orange, mandible grey-black; feet grey-black; wing 167 (156–82) mm, tail 73 mm, culmen from cere 21 mm, tarsus 20 mm. Female: like male but head all round brown, and bill greyish black, and size slightly less. Young birds have a green head.

RANGE Lesser Sunda Islands to New Guinea and its satellite islands and northern Queensland; lowlands to 1,500 ft.

SUBSPECIES IN NEW GUINEA Eight, some well marked, some not:

a) *cyanicarpus* (Hartert); Rossel Island, Louisiade Archipelago; rump green; bend of wing blue; no red in upper wing-coverts; general plumage dark green; male wing 182 mm, female wing 175 mm.

b) *sudestiensis* (De Vis); Misima and Tagula, Louisiade Archipelago; like *cyanicarpus* but bend of wing green; general body plumage lighter more yellowish green; male wing 173 mm, female wing 165 mm.

c) *orientalis* (Meyer); Huon Peninsula; rump green; like *sudestiensis* but with a rusty red spot in lesser upper wing-coverts and female with head mostly brown; male wing 170 mm, female wing 155 mm.

d) *aruensis* (Gray); Aru Islands, southern and eastern New Guinea (west in south to Mimika River, in north to Kumisi River), and Fergusson and Goodenough Islands; rump green; very like *orientalis* but blue of under wing and blue of head of male darker; male wing 163–8 mm.

e) *pucherani* (Souancé); western Papuan Islands and north-western New Guinea east to Etna Bay and head of Geelvink Bay; differs from all the above in rump red; under wing-coverts dark blue; red patch of upper lesser wing-coverts absent or small if present; male wing 157–66 mm, female wing 154–8 mm.

f) *jobiensis* (Meyer); Japen and Meos Num Islands, Geelvink Bay; rump red like *pucherani* but red of wings paler, red area of forehead larger and blue of under wing pale; male wing 173–6 mm, female wing 161–71 mm.

g) *minor* (Neumann); northern New Guinea from Mamberamo River to Astrolabe Bay area; rump red; like *jobiensis* but smaller; male wing 156–74 mm, female wing 150–67 mm.

h) *mysorensis* (Meyer); Biak and Numfor Islands in Geelvink Bay; rump red; under wing-coverts dark blue; blue of hind neck and red

of throat more extensive posteriorly than in *minor*; red patch on upper wing-coverts larger and more constant than in *minor*.

NESTING The nest was made in an excavation made by the birds themselves in a big, dead, standing trunk in the forest and some distance (about thirty-five feet) from the ground. The excavation included an entrance and short tunnel just large enough for the bird to enter, and this went in and enlarged downward into a roomy nest chamber whose floor was thickly lined with fresh chips; eggs three, roundish, white; size 29 × 25 mm. (One record.)

REMARKS Though not uncommon in some localities, this parrot was usually not conspicuous. It was often found singly or in pairs; occasionally a small number were seen at some fruiting tree; usually high in the forest, occasionally in the lower stories of the trees in the savannah and in the shrubbery edging lagoons. The food appeared to include fruit, seeds and flower buds.

***Geoffsoyus simplex* (Meyer)**

Blue-collared Parrot. Length 9–10 in. Adult male: top of head olive-green; hind neck pale blue or grey as part of collar round neck; rest of upperparts dark green (with or without an olive or dusky wash on back and rump) except for patch of rusty brown in upper wing-coverts, some concealed yellow in tips of innermost flight feathers, and wing quills black with green outer edgings; side of head and neck and underparts green (paler than back) except for narrow pale blue or blue-grey collar, yellowish undersurface of tail and black underside of wing quills and blue under wing-coverts and axillaries; iris white or grey; bill black; feet olive; wing 160 (151–61) mm, tail 73 mm, culmen from cere 22 mm, tarsus 17 mm. Female: like male but lacks the blue-grey collar and has the green crown tinged bluish.

RANGE Mountains of New Guinea from 2,000 to 5,500 ft; occasionally down to near sea level.

SUBSPECIES Two:

a) *simplex* (Meyer); Arfak Mountains; collar in male light blue.
b) *burgersi* (Neumann); Snow Mountains to south-eastern New Guinea; like *simplex* but male with collar grey glossed with some violet.

NESTING One nest found: a nest cavity about thirty feet up, made by the birds in a big, dead trunk standing in the forest, very like that of *G. geoffroyi*; it contained three young of quite different sizes.

REMARKS On the slopes above the Idenburg River this parrot was not uncommon in the tops of the forest trees, singly or in pairs, and its

short, sharp, oft-repeated cry was frequently heard. Its food included small seeds.

***Tanygnathus megalorhynchus* (Boddaert)**

Moluccan or Island Parrot. Length 15 in. Adults: upperparts: top and sides of head green; back and sides of neck olive-green; centre of back dull pale blue; rump bright pale blue; upper tail-coverts green; tail green tipped with yellow; scapulars black edged green or blue; lesser upper wing-coverts black with blue margin; middle wing-coverts black with yellow edges forming a conspicuous patch; greater wing-coverts mostly blue and green; inner flight feathers mostly green with some blue and dusky and some pale green-yellow margins; outer flight feathers black edged with bright blue; underparts: dull yellow tinged green especially on sides of breast and thighs and under tail-coverts; under wing-coverts and axillaries bright yellow; underside of wing quills greyish black, the inner ones edged with yellow; iris yellow; bill red; tarsus dusky. Male wing 255 mm, tail 150 mm, culmen from cere 47 mm, tarsus 24 mm. Female: smaller, wing 235 mm.

RANGE Islands off Celebes and Lesser Sunda Islands to western Papuan Islands, and islets near Sorong.

SUBSPECIES IN NEW GUINEA One, *megalorhynchus* (Boddaert); which also ranges to northern Moluccas and islands off Celebes.

REMARKS This is a small island species in the New Guinea area at least. Ripley writes, that it wanders from island to island in search of its favourite food which is a green, lemon-sized fruit from which the pulp is eaten and the pit rejected to litter the ground under the trees where the birds are feeding.

***Aprosmictus erythropterus* (Gmelin)**

Red-winged Parrot. Length 12 in. Adult male: top of head and neck bright blue-green; back and shorter scapulars black; wing-coverts red; inner flight feathers mostly green; central ones black, outer flight feathers black broadly edged green; rump blue, paler posteriorly, upper tail-coverts pale yellow-green; central tail feathers dark green tipped yellow; outer tail feathers blackish, broadly edged green and tipped yellow; underparts pale yellowish green except for underside of tail which is black tipped yellow, and under wing which is black with green lesser under wing-coverts; iris red brown; bill red; feet dusky; wing 183 (181–96) mm, tail 130 mm, culmen from cere 19 mm, tarsus 20 mm. Female: a much duller bird; upperparts with crown, to back and inner wing-coverts and scapulars dull green; the outer lesser and most of greater wing-coverts red; wing quills black edged green except for a

few central ones; rump pale blue; upper tail-coverts pale yellow-green; tail mostly green with yellow or pink tip; underparts much like those of male; wing 180–9 mm.

RANGE Northern and eastern Australia and southern New Guinea from Princess Marianne Straits to Oriomo River; lowland savannah.

SUBSPECIES IN NEW GUINEA One, *papua* (Mayr and Rand).

NESTING [In a hole in a tree; eggs three, white; size 29 × 25 mm. Australian data.]

REMARKS The red-winged parrot is a bird found in wooded savannah within a score or so of miles of the coast and not farther inland. It was fairly common, often seen in parties of ten to fifteen birds and was rather shy and nervous. Sometimes it fed on the fruit of the tea trees. I was told that flocks of several hundreds of these birds appeared near the coast in April.

**Key to *Alisterus* Species**

1 A conspicuous pale green stripe in dark green upper wing-coverts: *A. chloropterus* (part).
Upper wing-coverts uniform dark green: 2.

2 Head and breast red: *A. amboinensis*.
Head green, breast green or green and red: *A. chloropterus* (part).

***Alisterus amboinensis* (Linnaeus)**

Amboin King Parrot. Length 15 in. Adult male: head and neck all round red; back to upper tail-coverts dark blue; tail black glossed blue; scapulars and wings green; throat to abdomen red like head except for a little blue in flanks; under tail-coverts black with broad red margins; underside of tail black; under wing black with some blue in under wing-coverts; iris red; bill orange-red; feet black; wing 195 mm, tail 192 mm, culmen from cere 22 mm, tarsus 19 mm. Female: much like male.

RANGE Moluccas to western Papuan Islands and north-western New Guinea east to Etna Bay and Weyland Mountains; lowlands, up to 4,000 ft.

SUBSPECIES IN NEW GUINEA One, *dorsalis* (Quoy and Gaimard).

REMARKS In the Weyland Mountains, Stein found this species always in pairs; it was scarce. One pair was seen investigating the stump of a tree in the forest as though in search of a nest site.

***Alisterus chloropterus* (Ramsay)**

Papuan King Parrot. Length 15 in. Adult male; head all round red; neck

all round red with a blue half collar at base of hind neck or with blue of half collar expanding up back of neck to nape; foreback, scapulars and upper surface of wings dark green to greenish black (sometimes almost black on foreback) with a conspicuous pale green stripe from lesser wing-coverts to longer scapulars; centre of back to rump bright dark blue; upper tail-coverts black washed blue, tail black; underparts red except for a small patch of blue on each side of breast, undersurface of tail which is black, undersurface of wing quills which is black, and some under wing-coverts which are blue; iris red; bill black with basal half of maxilla red; feet black; wing 200 (185–200) mm, tail 210 mm, culmen from cere 22 mm, tarsus 22 mm. Female: like male but back green with little or no blue at base of neck, patches on side of breast green, and some under wing-coverts green instead of blue, or quite different from male in having top and sides of head, back, and uppersurface of wing uniform dark green; rump bright dark blue (sometimes with a little red at sides); uppersurface of tail black washed green; throat to breast green with or without red tips to feathers; the abdomen to under tail-coverts is red; undersurface of tail and wing quills are black, and under wing-coverts mixed blue and green.

RANGE New Guinea west to Weyland Mountains (where it overlaps the range of *A. amboinensis*); sea level to 2,000 ft.

SUBSPECIES Three:

a) *moszkowskii* (Reichenow); northern New Guinea from Geelvink Bay to Aitape area; male with a narrow blue band at base of hind neck; female much like male but with back green and patch on sides of breast green.

b) *callopterus* (D'Albertis and Salvadori), (*wilhelminae*, Ogilvie-Grant, is not separable); south New Guinea from Snow Mountains to upper Fly River, and also northern New Guinea in Sepik River area and Central Highlands; male very similar to that of *moszkowskii*; female differs in having top and sides of head and neck, to middle of back and uppersurface of wings uniform green and breast more or less green.

c) *chloropterus* (Ramsay); eastern New Guinea, west in the north to Huon Peninsula, in the south to Hall Sound; like *callopterus* but male with broader blue band at base of hind neck; blue extends up back of neck to nape.

REMARKS The king parrot was rather uncommon. It frequented the smaller trees and larger shrubs in the forest where it was usually found singly or in pairs and was inconspicuous and quiet. It allowed a close approach, but often it was not seen until it flew.

**Key to *Psittacella* Species**

1 Head mostly green with no brown: *P. madaraszi* (female).
Crown at least brown, or whole head brown or olive-brown, contrasting with back: 2.

2 Breast heavily barred black and orange or yellow: 3.
Breast not barred: 5.

3 Breast barred black and orange, barring on back obscure or absent: *P. modesta* (female).
Breast barred black and yellow, barring on back also distinct: 4.

4 Cheeks brown like crown: *P. brehmii* (female).
Cheeks bluish, contrasting with brown crown: *P. picta* (female).

5 Conspicuous yellow crossbar on sides of neck: 6.
No yellow bar on side of neck: *P. modesta* and *P. madaraszi* (males).

6 Cheeks and upper throat brown: 7.
Part of cheeks and upper throat bluish, contrasting with crown: *P. picta* (male, part).

7 Breast yellow-green: *P. brehmii* (male).
Breast dark green with blue area: *P. picta* (male, part).

***Psittacella brehmii* (Schlegel)**

Brehm's Parrot. Length 7½–9½ in. Adult male: head brown to olive-brown; back densely barred green and black; rump and upper tail-coverts barred yellow-green and black; upperside of wing green, wing-coverts sometimes obscurely barred with dusky, and wing quills dusky edged green except towards the tips of the outer ones which have a narrow yellowish white margin; upperside of tail green; side of head brown with a yellow bar on each side of neck; lower throat to abdomen green more or less yellow tinged; under tail-coverts red; underside of tail blackish; under wing blackish except for green under wing-coverts; iris brown; bill bluish, paler at tip; feet grey; wing 125 (114–41) mm, tail 90 mm, culmen from cere 20 mm, tarsus 19 mm. Female: like male but lacks the yellow neck patches and breast and flanks are barred black and yellow.

RANGE Mountains of New Guinea, from 5,500 to 11,500 ft.

SUBSPECIES Five:

a) *brehmii* (Schlegel); mountains of Vogelkop; male with head dark brown; little yellow in green of underparts; male wing 124 mm, female wing 123 mm.

b) *intermixta* (Hartert); Snow Mountains; like *brehmii* but male with underparts more yellowish green and pale barring on back more yellowish green; wing 122–41 mm.

c) *burgersi* (Reichenow); Sepik Mountains; needs confirmation.

d) *harterti* (Mayr); Huon Peninsula; like *intermixta* but smaller, wing

114–23 mm; male with brown of head much paler and more olive; green of plumage less yellowish; and in female barring of underparts more restricted to breast, with little in flanks.

e) *pallida* (Meyer); south-eastern New Guinea west to Hindenburg Mountains; like *harterti* but male with green of plumage more yellowish, head darker and more brownish, and in female barring of flanks more extensive; like *intermixta* but smaller, head paler, and green of plumage less yellowish; wing 116–26 mm.

REMARKS A solitary species often found low in the forest. Its food includes fruits of coniferous trees.

### *Psittacella picta* (Rothschild)

Timber-line Parrot. Length 7½ in. Colour varies with subspecies. Adult male: crown and hind neck red-brown or olive-brown; back to rump barred black and green or yellowish green; lower rump and upper tail-coverts dark red barred black or yellow barred black; tail and wings mostly green; side of head brown, olive-brown or partly bluish; side of neck with conspicuous yellow bar; upper throat brown or bluish; breast and abdomen green; under tail-coverts red; underside of tail greyish black; iris orange-yellow; bill grey with whitish tip; feet grey. Female: like male but without yellow in neck, and with breast barred yellow and black. Wing 112 (106–21) mm, tail 75 mm, culmen from cere 15 mm, tarsus 17 mm.

RANGE High mountains of New Guinea from 8,000 to 12,000 ft.

SUBSPECIES Three quite distinct ones:

a) *picta* (Rothschild); south-eastern New Guinea (Wharton and Owen Stanley ranges); male with crown red-brown; yellow half collar across hind neck, bordered anteriorly with red-brown; side of head dull brown; lower rump and upper tail-coverts barred with black and red; upper breast dark blue in centre and midline of belly washed pale blue; female with red-brown crown, hind neck and side of neck; cheeks blue, and upper tail-coverts red barred black.

b) *excelsa* (Mayr and Gilliard); Central Highlands (Mt Kubor, Mt Hagen, Mt Wilhelm); male as in *picta* but crown and hind neck olive-brown; yellow patches restricted to side of neck; no red-brown in side of head or neck; female as in *picta* but red-brown of head and neck replaced by olive-brown.

c) *lorentzi* (van Oort); Snow Mountains (Orange Range); male as in *excelsa* but upper tail-coverts barred black and yellow; sides of head dusky blue-green becoming black posteriorly; throat blue-green becoming green on the breast and yellow-green on abdomen;

female as in *excelsa* but upper tail-coverts barred yellow and brown of side of head and neck replaced by blue-green.

REMARKS This parrot was fairly common in the denser forest near the timber line where it was found singly or in pairs. Sometimes it was found feeding on the fruit of the conifer *Dacrydium*, sometimes low in the forest. When in the trees it was a quiet bird, moving little and allowing a close approach, but when flushed it had a swift, direct flight. Occasionally one was flushed from the ground where short grass covered damp places in the forest glades.

***Psittacella modesta* (Schlegel)**

Barred Little Parrot. Length 6 in. Adult male: top of head and nape dark olive-brown, the feathers with paler centre; hind neck same or with an irregular bar of yellow across base of hind neck; rest of upperparts green except some of back feathers with obscure dusky edges, and for rump which is barred black and yellowish green, and outer flight feathers which are dusky black edged green basally and narrowly whitish yellow distally; side of head brown or olive-brown; throat and upper breast olive-brown to greenish washed brown, changing to light green on abdomen; under tail-coverts red, undersurface of tail greyish; a little blue in bend of wing, under wing dusky grey, the quills obscurely edged yellow and the under wing-coverts washed with the same; iris yellow-brown; bill blue-grey; feet blue-grey; wing 95 (94–100) mm, tail 60 mm, culmen from cere 13 mm, tarsus 13 mm. Female: upperparts like those of male but head duller and yellow band on hind neck nearly or quite absent and sometimes dusky edging of back feathers more distinct; underparts like those of male but breast barred yellowish orange and black, and flanks barred yellowish green and dusky. Immature male: apparently like female with barred breast. Occasional females, apparently adult, have a few feathers in crown or nape barred black and pink.

On the north slope of the Snow Mountains birds from higher altitudes tend to be larger in size: males from below 7,000 ft have wing 94–98 mm, those from 7,000 ft and above 96–100 mm.

RANGE Vogelkop, Snow Mountains, and Central Highlands; 5,500 to 9,000 ft.

SUBSPECIES Three or perhaps four:

a) *modesta* (Schlegel); Vogelkop; male hind neck olive-brown.
b) *collaris* (Ogilvie-Grant); southern slope Snow Mountains; like *modesta* but male with an irregular yellowish collar on hind neck between brown of head and green of back.
c) *subcollaris* (Rand); northern slope of Snow Mountains and to Hindenburg Range; like *collaris* but male with head darker; yellow

collar on hind neck brighter in colour but narrower; and green of back darker.

d) subspecies? Central Highlands (Mt Hagen, 7,000 ft), one immature male seen; Mt Giluwe, one female reported, wing 102 mm.

REMARKS This little parrot was a not uncommon bird on the north slopes of the Snow Mountains. It was usually found singly or in pairs in the lower parts of the forest trees where it fed on seeds and fruit.

***Psittacella madaraszi* (Meyer)**

Plain-breasted Little Parrot. Length 6 in. Adult male: much like adult male of *P. modesta*, but never with yellow bar across hind neck; iris reddish; bill pale blue-grey; feet grey; wing 88 (83–98) mm, tail 50 mm, culmen from cere 15 mm, tarsus 14 mm. Female: rather different from male and from female of *P. modesta*; forehead blue; crown barred black and green changing to black and orange (sometimes green) barring on hind neck; back green with faint black barring; rump distinctly barred black and yellow-green (sometimes more yellowish and with a few flecks of orange); side of head green; underparts yellowish green, with some faint dusky barring on breast. Immature males: like female.

RANGE New Guinea mountains from Weyland Mountains to south-eastern New Guinea and Huon Peninsula, from 4,000 to 8,000 ft.

SUBSPECIES Four:

a) *major* (Rothschild); Weyland Mountains and north slope of Snow Mountains, 4,000 to 5,000 ft; male wing 93–98 mm, female wing 90–96 mm.

b) *madaraszi* (Meyer); south-eastern New Guinea west in south to Angabunga River, in north to Mt Misim, 6,000 to 8,000 ft; like *major* but smaller; male wing 83–89 mm, female 80–86 mm.

c) *huonensis* (Mayr and Rand); Huon Peninsula, 4,000 to 5,000 ft; like *madaraszi* but female lacks red tips to feathers of nape and hind neck and a reduction of black barring above; male like *madaraszi* but brown of crown more yellowish; male wing 93 mm.

d) *hallstromi* (Mayr and Gilliard); Central Highlands and Hindenburg Range; like *madaraszi* but male with head and breast darker brown and yellow streaks of head narrower; wing 90–94 mm.

REMARKS The close similarity of the males of *P. madaraszi* and *P. modesta* does not permit a specific diagnosis. The females of the two, however, are very different. *P. madaraszi* is the only form in south-eastern New Guinea; *P. modesta* the only one in Vogelkop. Where the two species have been found near each other as in the Central Highlands, Hindenburg Range, and the Snow Mountains, no intergrades

have been found and our limited data suggest that *P. madaraszi* may prove a slightly lower altitude species with a slightly larger, stouter bill.

***Loriculus aurantiifrons* (Schlegel)**

Bat Lorikeet. Length 3½–4 in. Adult male: forehead yellow or orange-yellow; rest of upperparts green except for upper tail-coverts which are orange-red to red and long enough to conceal nearly the whole tail quills; underparts green except for a red spot on centre of throat and for underside of wing which is dusky and has edges of wing quills edged light blue; iris white or brown; bill black; feet black; wing 70 (65–73) mm, tail 30 mm, culmen from cere 8 mm, tarsus 9 mm. Female: like male but forehead green washed blue, and side of head washed blue; red spot in throat averages smaller; wing 64–76 mm.

RANGE New Guinea and some satellite islands and Bismarck Archipelago.

SUBSPECIES IN NEW GUINEA Three:

a) *aurantiifrons* (Schlegel); Misol.
b) *batavorum* (Stresemann); Waigeu and north-western New Guinea east in the north to the Sepik region and in south to Setekwa River; like *aurantiifrons* but male with less yellow in forehead and with less orange, also bill smaller; male wing 65–71 mm., female wing 64–69 mm.
c) *meeki* (Hartert); south-eastern New Guinea (west in north to Huon Peninsula and in the south to Angabunga River), also Fergusson and Goodenough Islands; like *batavorum* but larger; male wing 71–73 mm, female wing 70–76 mm.

REMARKS This seems to be one of the rare New Guinea birds and we have seen it alive in the field only once; a single bird low in the forest. Natives brought in only three of them.

# Order 13 Cuculiformes

## Cuckoos, etc.

*Two families, one in New Guinea*

### Family Cuculidae *Cuckoos,* etc.

*(150 species, twenty-one in New Guinea)*

This family of about 150 species has a widespread distribution in the warmer parts of the world, with twenty-one species in New Guinea. These are conveniently divided into (a) tree cuckoos, and (b) coucals. Tree cuckoos seem shy, stealthy, retiring birds found in the branches of forest trees. Presumably, they sit up rather stolidly and move about quietly getting their large insect food from leaves, twigs and branches. We very rarely saw them doing this, and the very few times we did see them feeding on fruit may not have been typical. Usually we found these birds giving their loud calls or songs, and they were heard far more often than they were seen. Many at least of these tree cuckoos, are surely parasitic in nesting habits, as are their relatives elsewhere, laying their eggs in other birds' nests and leaving them to be cared for by the foster parents. Apart from a few eggs, presumed to be cuckoos', found in other birds' nests, we have no New Guinea data on this. In the warbler nests found by the middle Fly River, cuckoos' eggs were commonly present, but cuckoos were rarely seen.

Northern and southern species of cuckoos make long migrations, and at least one from Asia and several from Australia or New Zealand reach New Guinea during their non-breeding season. However, the migratory as opposed to the breeding status of some New Guinea cuckoos is imperfectly known, despite the necessity of knowing this before taxonomy at the species level can be established.

In short, this is a very difficult group of birds to study in the field. The difficulties are enhanced by the difficulty of working in a rain forest habitat. There are, however, indications of intriguing aspects to the behaviour of these birds.

The coucals, genus *Centropus*, are birds of the shrubbery and grass. They creep about through the vegetation, feeding on large insects and small vertebrate animals, flying little, and often sitting up and giving

conspicuous songs. The birds make their own nests and raise their own young.

**Key to Cuculidae Genera**

1 Length 17–27 in.; tail broad and much longer than head and body; bill strong, curved and about as long as head; plumage spiny; all black or with barred wings, sometimes tail barred, and sometimes body obscurely and irregularly patterned buffy, brown and black; birds of grass and shrubbery: *Centropus*.
Length 5–23 in.; bill various; tail about as long as head and body; plumage smooth, various, including all black; birds of the trees: 2.

2 Underparts with distinct barring: 3.
Underparts without distinct barring: 5.

3 Size small, length 5–8 in.; back often glossy: *Chalcites*.
Size larger, length 11–16 in.: 4.

4 Back grey, without spots; length 11–14 in.: *Cuculus* (part).
Back blackish with many pale spots and bars; length 15–17 in.: *Eudynamis*.

5 (a) Plumage mostly black, underparts all black; length 12–17 in.: 6.
(b) Underparts whitish streaked brown, back barred; length 14–16 in.: *Eudynamis* (part).
(c) Underparts grey to brown to red-brown, without streaks; length 7–23 in.: 7.

6 All black except for broad white crown streak; length 12–14 in.: *Caliechthrus*.
All black including crown; length 14–17 in.: *Eudynamis* (part).

7 (a) Size very large, length 20–23 in.; bill longer than head, strong and deep; underparts grey: *Scythrops*.
(b) Length 12–13 in.; bill shorter than head; underparts all pale grey: *Cuculus* (part).
(c) Length less than 12 in.; bill as long as head or shorter; underparts grey (tinged rufous at least on under tail-coverts) to brown to red-brown: 8.

8 (a) Side of head grey with conspicuous black patch on ear-coverts: *Misocalius*.
(b) Top and side of head black with a white and rufous stripe from nostril to below eye and to ear-coverts: *Microdynamis* (part).
(c) Not as above: 9.

9 (a) Length 7–8 in.; bill as long as head; some obscure barring in tail which is rounded at tip; very rare, obscurely grey-brown and brown birds: *Rhamphomantis*.
(b) Length 7½–8½ in.; bill half as long as head and stout; no barring in tail which is square to slightly rounded at tip; rare, obscurely grey-brown to red-brown birds: *Microdynamis* (part).

(c) Length 7½–11 in.; bill two-thirds length of head; always some barring in tail which has tip graduated (outer quills much shorter): *Cacomantis*.

**Key to *Cuculus* Species (Adults)**

1 Underparts grey without bars: *C. pallida*.
Underparts barred: 2.
2 Throat dull white, black bars on breast fine: *C. canorus*.
Throat pale blue-grey, black bars on breast coarse: *C. saturatus*.

[***Cuculus canorus*** **(Linnaeus)**

Common Northern Cuckoo. Length 12–13 in. Adult male: upperparts dark ash-grey except wing quills greyish brown and tail blackish; sides of head, throat and upper breast clear grey; rest of underparts white with narrow dark grey barring; flight quills boldly barred and spotted with white; iris dull orange-yellow; bill horn-grey to yellowish green at base of lower mandible; feet orange-yellow; wing 222 mm, tail 150 mm, exposed culmen 21 mm, tarsus 20 mm. Female: like male but slightly smaller; wing 212 mm. Young: variable reddish brown or greyish brown with faint or bold barring and a white patch in nape.

RANGE Breeds in Eurasia. In winter migrates to Africa, Japan, Formosa, Philippines, and perhaps New Guinea.

REMARKS The only records of the occurrence of this Palearctic species in New Guinea are very old ones made when the genus was poorly understood.]

***Cuculus saturatus*** **(Blyth)**

Oriental Cuckoo. Length 11½–13¼ in. Adults: upperparts and head as in *C. canorus* but darker, more bluish grey; underparts somewhat darker on throat and with broader, bolder barring on abdomen; iris tan with a light outer ring; maxilla black; mandible dull olive with a black tip; gape, eye-ring and feet yellow; wing 185–212 mm, tail 140–67 mm, exposed culmen 22·5 mm, tarsus 19 mm. Juvenile: upperparts reddish brown with dark barring.

RANGE Widespread in Asia from Arctic to Japan and Formosa; winters south and east to southern India, Philippines, Celebes, Moluccas, western Papuan Islands, New Guinea, Bismarck Archipelago, Solomon Islands and Australia.

SUBSPECIES IN NEW GUINEA Two rather similar ones:

a) *horsfieldi* (Horsfield and Moore); Asia, Japan; south in winter from India to Australia, New Guinea and the Solomon Islands; wing long.

b) *saturatus* (Blyth); southern Asia (Himalayas to Formosa); south in winter to Papuan region; like *horsfieldi* but wing less than 192 mm.

REMARKS An uncommon winter visitor usually encountered in savannah country near sea level. It is a bird found in the treetops and in flight has somewhat the appearance of a small, short-winged, long-tailed hawk such as *Accipiter*.

### *Cuculus pallidus* (Latham)

Pallid Cuckoo. Length 12½ in. Adults: upperparts greyish brown, hind crown with a large, semiconcealed spot; nape feathers tipped inconspicuously with pale ochraceous; underparts pale mouse-grey becoming greyish white on lower abdomen and under tail-coverts; flight quills boldly marked with white; iris brown; bill black; feet dark greyish brown; eye-ring yellow. Wing 190 mm, tail 156 mm, exposed culmen 21 mm, tarsus 23 mm.

RANGE Australia and Tasmania; in winter to Moluccas and New Guinea.

REMARKS Rare in New Guinea where this winter visitor is apparently known from only one record (Momi, Geelvink Bay).

### Key to *Cacomantis* Species (Adults)

1 Length 7½–9 in.: 2.
Length 10–11 in.: 3.

2 Upperparts slaty; breast and abdomen rich chestnut; wing 105–17 mm: *C. castaneiventris*.
Upperparts greyish olive; breast usually greyish, sometimes ochraceous; wing 113–36 mm: *C. variolosus*.

3 Back bluish slate; breast dark, dull reddish brown; wing 136–45 mm; high mountains: *C. pyrrhophanus excitus*.
Back bluish grey; breast greyish ochraceous; wing 144 mm; lowlands: *C. p. prionurus*.

### *Cacomantis variolosus* (Vigors and Horsfield)

Grey-breasted Brush Cuckoo. Length 7½–9 in. Adults: upperparts brownish olive with a dull sheen, somewhat more greyish on head and nape; wing quills fuscous with some light buff to ochraceous inner edging; tail dark brown to blackish with small to medium white notching and tipping; underparts variably cinnamon-brown to grey, brightest on under tail-coverts; throat and breast usually greyish; iris russet-brown; bill brownish black, paler at base; feet chrome-yellow; mouth orange-red. Wing 110–21 mm, tail 99 mm, exposed culmen 18 mm, tarsus 14 mm. Immature: underparts barred and notched and extremely variable.

RANGE South-east Asia east to Philippines, East Indian, Papuan, Admiralty, Bismarck and Solomon Islands, and Australia. Sea level to about 5,500 ft.

SUBSPECIES IN NEW GUINEA Seven rather similar ones:

a) *infaustus* (Cabanis and Heine); islands of eastern Indonesia, Aru Islands, western Papuan Islands, Japen Island, north-west New Guinea eastward in south to Onin Peninsula and eastward in north to Sepik River; male wing 115–21 mm, female wing 118 mm.
b) *oreophilus* (Hartert); eastern New Guinea west in north to Astrolabe Bay and west in south to Snow Mountains (Mimika and Setekwa Rivers).
c) *fortior* (Rothschild and Hartert); islands off the north-east coast of New Guinea (Fergusson and Goodenough, D'Entrecasteaux Archipelago; Rook, Karkar, Manam Islands).
d) *chivae* (Mayr and de Schauensee); Biak Island, Geelvink Bay; like *infaustus* but smaller and darker above and below; wing 113–19 mm.
e) *obscuratus* (Stresemann and Paludan); Numfor Island, Geelvink Bay; like *infaustus* but decidedly paler, more greyish below.
f) *variolosus* (Vigors and Horsfield); eastern and southern Australia, on migration to Moluccas, Arus, western Papuan Islands and New Guinea.
g) *tymbonomus* (S. Müller); north and north-western Australia, on migration to islands of eastern Indonesia and southern New Guinea.

NESTING [Parasitic; eggs white with spots, laid in cup-shaped nests. Australian data.]

REMARKS This is probably a fairly common solitary species in both the forests and the savannahs throughout its range, but it is seldom seen except when calling. Then it often mounts to some conspicuous perch, often a dead tree in a clearing or garden, to sit for long periods giving its whistled three-note call, which the Dutch render 'Piet Van Fleet'. This bird's food is apparently chiefly hairy caterpillars. See remarks under *C. pyrrhophanus*.

### *Cacomantis pyrrhophanus* (Vieillot)

Fan-tailed Brush Cuckoo. Length 10–11 in. Adult male: upperparts grey to dark slate with an oil green gloss; wing quills dark fuscous, some of outer primaries with white in inner edges forming a semiconcealed white patch; tail quills blue-black with narrow light notches, bars and tips; underparts: throat greyish, breast and abdomen pallid cinnamon grey to deep rufous brown, often with fine dark vermiculation and freckling on sides and abdomen; iris dark brown; bill blackish brown; feet yellow to greenish yellow; eye-ring bright yellow; wing 136–45

mm, tail 134 mm, exposed culmen 17 mm, tarsus 18 mm. Female: duller below. Immature: dark brown above and generally barred.

RANGE Australia, Tasmania, New Guinea, Aru Islands, Solomon Islands, New Hebrides, New Caledonia, Loyalty Islands, Fiji Islands. From sea level to 12,200 ft.

SUBSPECIES IN NEW GUINEA Two well differentiated ones:

a) *excitus* (Rothschild and Hartert); mountains throughout New Guinea; upperparts dark slate with an oil green sheen; underparts deep rufous brown; 4,500 to 12,200 ft.
b) *prionurus* (Lichtenstein); Australia and Tasmania, on migration to Aru Islands and central New Guinea (Wahgi area); like *excitus* but upperparts grey and underparts pallid cinnamon; lowlands.

NESTING [Parasitic: deposits a single egg in dome-shaped nests of much smaller host species such as warblers. Egg: white with small specks and freckles of brown and purple; size 22 × 15 mm. Australian data.]

REMARKS Sometimes fairly common in original and secondary forests and forest edges, but generally uncommon or unaccountably absent. In mountainous regions it was most often encountered along trails, where it perched upright on conspicuous perches such as in the branches of a dead tree. This cuckoo's song is a rich, full trill of several seconds, duration, and its food is caterpillars. The dull-coloured New Guinea race is a mountain bird, most like *C. castaneiventris*, but larger and with darker duller breast; the pale-coloured Australian race is a lowland bird, more like *C. variolosus* but larger and with greyer back. These are fairly slender birds that often sit rather upright and seem rather long-tailed.

### *Cacomantis castaneiventris* (Gould)

Chestnut-breasted Brush Cuckoo. Length 8–9 in. Adults: upperparts, head, sides of face and chin dark greyish blue; wing quills brown with much white on basal halves; tail quills purplish black with white tips and notches; underparts cinnamon brown to chestnut-brown, often with faint dusky vermiculations; wing linings white tinged with cinnamon; iris brown; bill black; feet dull yellowish; eye-ring bright yellow; gape reddish orange. Wing 105–17 mm, tail 110 mm, exposed culmen 18 mm, tarsus 20 mm. Immature: generally greyish brown; dark above and pallid (and unbarred) below.

RANGE Western Papuan Islands, Aru Islands, New Guinea and northern Australia. Sea level to 4,000 ft.

SUBSPECIES IN NEW GUINEA Three similar ones:

a) *castaneiventris* (Gould); Cape York and Aru Islands; underparts pale chestnut.

b) *arfakianus* (Salvadori); western Papuan Islands (Misol, Salawati) and north-western New Guinea east in north to Mamberamo River and east in south to Fly River; underparts dark chestnut; wing 110–117 mm.
c) *weiskei* (Reichenow); mountains of south-east New Guinea, Huon Peninsula, and Sepik region; like *arfakianus* but slightly darker and wing averaging shorter, 105–12 mm.

REMARKS In New Guinea this cuckoo is generally fairly common in both the forest and the secondary bush. It is often found sitting alone on an exposed branch where it is apt to stay for considerable periods of time, at frequent intervals uttering a full rich trill that is very distinctive. See remarks under *C. pyrrhophanus*.

### *Misocalius osculans* (Gould)

Black-eared Cuckoo. Length 7½–8½ in. Adults: upperparts including top of head greyish brown with a faint metallic glint; wing quills brown with narrow pale outer edges and with much ochraceous on inner vanes; tail olive-brown to blackish with narrow whitish tips and indistinct barring on lateral rectrices; side of head whitish with ear-coverts boldly blackish; underparts greyish to buffy whitish, often tinged with ochraceous; iris brown; bill black; feet lead-brown. Wing 112 mm, tail 81 mm, exposed culmen, 15 mm, tarsus 20 mm.

RANGE Australia, during migration to Aru Islands, Kei Islands, Moluccas (Batjan Island) and New Guinea.

REMARKS Apparently this species is very uncommon in New Guinea, and it is rare in collections.

### Key to *Chalcites* Species (Adults)

1 Throat cinnamon-brown: *C. ruficollis*.
Not so: 2.
2 Forehalf of crown chestnut-brown: *C. meyerii*.
Not so: 3.
3 Crown and nape dull brown; central abdomen clear white without bars: *C. basalis*.
Crown and nape golden metallic-green, bronze or purple; abdomen barred: 4.
4 Inner vanes of remiges tinged pinkish vinaceous; much rufous in outer tail feathers: *C. malayanus*.
Inner vanes of remiges whitish; little or no rufous in outer tail feathers: *C. lucidus*.

### *Chalcites basalis* (Horsfield)

Narrow-billed Bronze Cuckoo. Length 6–8 in. Adults: upperparts glossy

yellowish green with much buff edging; crown and nape dark brown; superciliaries and sides of head white; a blackish brown spot behind eye; a narrow blackish streak at side of throat near gape; throat whitish, streaked narrowly with brown; upper breast tinged with pale clay-brown and indistinctly barred with sooty brown; rest of underparts white with bold dark bronze-green barring on flanks and under tail-coverts only; under wing-coverts white with dark barring; wing quills dark with pale whitish to pale ochraceous inner vanes basally; tail dark metallic-green above with white spotting on lateral quills and with much black on outer portions, and with basal half of outer three rectrices largely chestnut; iris brown; bill black; feet grey. Wing 101 mm, tail 69 mm, exposed culmen 14 mm, tarsus 17 mm.

RANGE Australia and Tasmania; in winter to Christmas Island, East Indian Islands and, casually, to the Aru Islands.

REMARKS Rare in the New Guinea region.

***Chalcites lucidus* (Gmelin)**

Golden Bronze Cuckoo. Length 6–6½ in. Adults: upperparts metallic golden green to dark vinaceous or pinkish brown; wing quills dark with much dull white on inner vanes; tail bronze-green to dark grey with a blackish subterminal bar and much broad white spotting on three outer rectrices; sides of head and all of underparts (including under wing-coverts) white with dark (green to bronze) barring; iris dark grey to light brown; bill blackish; feet greenish slate. Male wing 100–5 mm, tail 63 mm, exposed culmen 13 mm, tarsus 17 mm. Female: slightly smaller.

RANGE Southern Australia, Tasmania, New Zealand, Chatham, Norfolk(?), Howe(?), Santa Cruz, Banks, New Hebrides, Loyalty, New Caledonia, Rennell and Bellona Islands; in winter to northern Australia, Lesser Sunda Islands, New Guinea, Bismarck Archipelago, Solomon Islands and Louisiade Archipelago.

SUBSPECIES IN NEW GUINEA Two well-marked ones:

a) *lucidus* (Gmelin); Chatham Islands and New Zealand; in winter through Louisiade (Woodlark, Misima), Solomon and Bismarck Archipelagos; crown and nape greenish to pale pinkish brown.
b) *plagosus* (Latham); Tasmania and southern Australia; in winter to northern Australia, New Guinea and Bismarck Archipelago; like *lucidus* but crown and nape much darker, more dark pinkish brown.

REMARKS The Australian race is a common migrant to New Guinea where specimens have been taken from sea level to at least 5,000 ft during the April–September period.

***Chalcites ruficollis* (Salvadori)**

Reddish-throated Bronze Cuckoo. Length 6–6½ in. Adults: upperparts generally metallic yellowish green tinged with pinkish brown; wing quills fuscous with white to cinnamon inner vanes on basal halves; central dorsal rectrices above bronze-green with broad dark subterminal bars; remaining rectrices prominently banded and notched with black, white and chestnut; sides of head, throat and upper breast strongly marked with chestnut-brown; rest of underparts generally white with bold glossy greenish brown bars; iris brown; bill black; feet olive-grey. Wing 95–100 mm, tail 67 mm, exposed culmen 15 mm, tarsus 17 mm.

RANGE High mountains throughout New Guinea (except, apparently, the Huon Peninsula). From about 6,400 to 10,600 ft.

REMARKS A very uncommon and elusive bird; this species lives in the high mountain forests where it is usually encountered alone, anywhere from shrubbery close to the floor of the forest to the highest parts of the canopy.

***Chalcites malayanus* (Raffles)**

Malay Bronze Cuckoo. Length 5½–6½ in. Adults: upperparts glossy yellowish green, usually strongly tinged with pinkish bronze; wings brown with inner edges of quills largely pale cinnamon-brown; central tail quills like back with broad glossy green to blackish bars near tips; outer rectrices variably barred and spotted with black, white and chestnut; sides of head, usually including line over eye, with much white; underparts whitish with bold dark brown or green bars; under wing-coverts barred or unbarred; iris brownish red; eyelid red; bill black; feet dark grey. Wing 90–101 mm, tail 63 mm, exposed culmen 14 mm, tarsus 13 mm.

RANGE Northern Australia, New Guinea, Aru Islands, western Papuan Islands, D'Entrecasteaux Islands and Trobriand Islands, and the Malay Peninsula.

SUBSPECIES IN NEW GUINEA Three:

a) *poecilurus* (Gray); Aru Islands, western Papuan Islands (Misol Island, Waigeu), New Guinea and coastal islands (Manam and Karkar Islands), D'Entrecasteaux Islands (Fergusson and Goodenough) and Trobriand Islands; upperparts chiefly greenish brown strongly glossed with pinkish bronze; under wing-coverts barred.

b) *russatus* (Gould); Cape York Peninsula and south New Guinea (Mimika River to Merauke district); like *poecilurus* but upperparts more greenish, less pinkish bronze.

c) *misoriensis* (Salvadori); Biak Island, Geelvink Bay; like *poecilurus* but under wing-coverts without bars.

[A fourth subspecies, *crassirostris*, of the Moluccas, recorded for Sorong, is of doubtful occurrence.]

REMARKS Apparently fairly common but very secretive in the lowland forest, secondary growth and bushy clearings. More common near the coast but occasionally found as high as 4,500 ft. On the middle Fly River, where only one of this species was seen, the many nests of the warbler, *Gerygone magnirostris*, that were found had a high percentage of cuckoos' eggs in them. This indicates the returning nature of these cuckoos.

***Chalcites meyerii* (Salvadori)**

Myer's Bronze Cuckoo. Length 5½–6 in. Adult male: upperparts, including all of mantle, glittering green, often tinged with bronze on back; wing quills dark fuscous except largely chestnut on basal two-thirds of inner and outer webs; tail largely solid dark bronze-green to blackish with pale tips and with bold white barring on outer rectrices; side of the head like back; underparts including under wing-coverts white with bronze-green bars; iris brown; narrow eye-ring red; bill black; feet dark greyish to brown; wing 88–92 mm, tail 65 mm, exposed culmen 15 mm, tarsus 14 mm. Female: like male but fore-crown deep chestnut-brown, and slightly larger; wing up to 95 mm.

RANGE New Guinea. Sea level to about 5,000 ft.

REMARKS This cuckoo is a rather uncommon inhabitant of forests, second-growth formations and clearings. It is apparently most common at about 2,500 ft where it is usually encountered in second-growth forests and clearings. Its principal food is probably hairy caterpillars.

***Rhamphomantis megarhynchus* (Gray)**

Little Long-billed Cuckoo. Length 7–7½ in. Adult male: upperparts dark rust to dark sooty brown; wing quills dark brown, with a slight gloss and with buff to pale ochraceous inner edges; tail quills dark brown with traces of gloss, and with narrow paler tips and faint dark subterminal barring; outer tail quills with indistinct light and dark area; underparts greyish with a profusion of fine dark vermiculations and frecklings; under wing-coverts and inner edges of wing quills buffy to pinkish ochraceous; iris reddish brown; bill black; feet greyish blue; wing 93–97 mm, tail 69 mm, exposed culmen 21 mm, tarsus 15 mm. Female: brighter, more dull rust-brown above; wing up to 101 mm.

RANGE Aru Islands, western Papuan Islands (Waigeu and Misol Islands) and New Guinea.

SUBSPECIES Two or three rather well-marked ones:

a) *megarhynchus* (Gray); Aru Islands and New Guinea (Vogelkop, Mamberamo, Sepik and Kumusi Valleys); upperparts dark rusty brown; female with breast washed ochraceous.

b) *sanfordi* (Stresemann and Paludan); Waigeu Island; like *megarhynchus* but breast greyer, contrasting with ochraceous abdomen.

c) *subspecies*(?); Misol Island.

REMARKS This cuckoo is known only from a few specimens taken in the lowland tropical rain forest. The plumage seems variable in the few specimens we have seen; some have little freckling or barring below, some much; in some there is little ochraceous below, in others both the abdomen and flanks are ochraceous.

***Microdynamis parva* (Salvadori)**

Black-capped Cuckoo. Length 7¾–8½ in. Adult male: crown, nape and sides of head metallic blue-black, with a white and rufous stripe from nostril, under eye to ear-covert; upperparts generally rusty greenish brown with a dull sheen; wing quills dark fuscous with narrow rufous outer edges; tail blackish brown with narrow pallid tips; throat pale chestnut-brown; wing linings pale vinaceous brown; underparts brown, becoming lighter and more ochraceous on abdomen; iris crimson; bill black; feet blackish grey; wing 104–15 mm, tail 93 mm, exposed culmen 17 mm, tarsus 20 mm. Female: generally dull greyish brown with traces of grey barring below and traces of grey on throat and cheeks; iris hazel.

RANGE New Guinea; lowlands up to 5,000 ft.

SUBSPECIES Two fairly well-marked ones:

a) *parva* (Salvadori); all New Guinea except range of *grisescens*; upperparts generally brown to dark brown.

b) *grisescens* (Mayr and Rand); north New Guinea from Humboldt Bay to Watut and Kumusi Rivers; like *parva* but upperparts more greyish.

REMARKS This very distinct and uncommon to rare bird belongs to a monotypic genus that is confined to New Guinea. A female was observed feeding on a cluster of yellow fruits on a vine growing in the top of a second-storey tree near sea level in the Fly River region. This may or may not be typical of the species.

***Caliechthrus leucolophus* (Müller)**

White-crowned Koel. Length 12–14 in. Adults: generally blackish, the upperparts with a bluish sheen, the underparts generally dull greyish black; midline of head from base of bill to nape with a broad white band; under wing-coverts usually with some narrow white barring and

tipping; tail narrowly tipped white; iris brown; bill black; feet ash-grey. Wing 166–76 mm, tail 159 mm, exposed culmen 30 mm, tarsus 24 mm. Immature: barred with white below.

RANGE New Guinea, including Salawati Island. Lowlands up to 4,500 ft.

REMARKS This is the sole member of another genus of cuckoo that is known only from New Guinea. It is fairly common in the forests, forest edges and tall trees of coastal clearings where it is usually seen in the treetops, often in pairs. Its call is a loud, somewhat rolling 'Ka ha ha ha', and its food is apparently insects, including caterpillars.

### Key to *Eudynamis* Species (Adults)

1 Underparts glossy blue-black: *E. scolopacea* (male).
Not so: 2.
2 Underparts barred: *E. scolopacea* (female).
Underparts striped: *E. taitensis* (male and female).

### *Eudynamis scolopacea* (Linnaeus)

Indian Koel. Length 15–16½ in. Adult male: generally dark glossy blue to greenish black, duller below; iris red; feet slate-grey; bill greenish to horn-colour; wing 180–222 mm, tail 185 mm, exposed culmen 18 mm, tarsus 30 mm. Female: upperparts generally dark bronze to blackish brown with white or chestnut brown spots, bars or stripes (except one race with crown and nape uniform blackish brown); underparts generally grey to ochraceous, narrowly barred with dark brown, except dark markings of throat heavier and more irregular; side of head with a pale stripe from bill to ears under eye; flight quills fuscous, profusely barred with whitish to chestnut-brown. Young birds: resemble the female.

RANGE Widespread in eastern and southern Asia and the islands of the western Pacific, east to New Guinea, Bismarck Archipelago, Solomon Islands and south to Australia. Lowlands up to 3,900 ft.

SUBSPECIES IN NEW GUINEA Two well-marked ones:

a) *rufiventer* (Lesson); Aru Islands, western Papuan Islands (Misol, Salawati, Batanta, Waigeu), Traitor's Islands, Karkar Island and all New Guinea except range of *subcyanocephala*; female with rich chestnut markings above and with underparts strongly washed with ochraceous; male wing 180–96 mm. (The race *minima* (van Oort), known only from the Noord River and described as like *rufiventer* but wing smaller, is doubtfully distinct.)
b) *subcyanocephala* (Mathews); north Australia and south New Guinea (Merauke district to Fly River), as a migrant known from Aru Islands, Traitor's Islands in Geelvink Bay, and Kumusi River region

of south-eastern New Guinea; like *rufiventer* but dorsal spotting of female whitish, not chestnut; head solid blackish, not striped; and ground colour of underparts greyish, not ochraceous; wing larger, male wing 216–22 mm.

REMARKS Not much is known about the New Guinea populations of this species, which is rare in collections and probably in life. It is possible that the two races in New Guinea may be found breeding in the same areas, in which case they will have to be considered species. There are also confusing aspects of the variations in colour of the females. This species is apparently a bird of the treetops.

***Eudynamis taitensis* (Sparrman)**

also known as *Urodynamis taitensis*

Long-tailed Koel. Length 14–15½ in. Adults: upperparts, sides of head, wings and tail blackish brown variously barred, spotted and streaked with buff to chestnut-brown; superciliary and line under eye pale (buff to cinnamon); ear-coverts and malar region dark; underparts whitish with bold dark brown stripes; under wing-coverts whitish tinged with buff; iris yellowish; bill pale brown; feet brownish olive. Wing 182 mm, tail 216 mm, exposed culmen 25 mm, tarsus 27 mm.

RANGE New Zealand (breeding); in winter widespread in Oceania from the Papuan region, Bismarck Archipelago and Micronesia eastward to the Marquesas and Tuamotu Islands.

REMARKS Apparently a rare transient in the New Guinea region.

***Scythrops novaehollandiae* (Latham)**

Channel-bill Cuckoo. Length 20–23 in. Adults: head and neck all round grey; mantle dark greyish olive prominently scalloped with blackish; flight quills dark olive-grey with sooty black tips; tail quills dark greyish olive with broad white tips and broader black subterminal bars, and the outer quills with black barring on the under webs; underparts whitish with a suggestion of narrow greyish barring; iris ruby-red; bill fleshy brown to whitish at tip; feet lavender to grey; facial skin rose-red. Male wing 330–50 mm, tail 264 mm, exposed culmen 86 mm, tarsus 49 mm. Female: smaller, wing 316 mm.

RANGE Islands of eastern Indonesia (Flores, Babar, Timorlaut and Celebes) eastward to Australia, New Guinea and the Bismarck Archipelago.

NESTING [No nest is built, the species being parasitic, chiefly on crows. The channel-bill, unlike other parasitic cuckoos, often deposits more than one egg in the same nest. Australian data.]

REMARKS This is an uncommon species in New Guinea. The majority of records are of winter migrants from Australia. In superficial appearance this cuckoo is very similar to the grey crow, even to the long pale bill which is even larger in the cuckoos than in the crows.

### Key to *Centropus* Species (Adults)

1 Wing (coverts and quills) spotted and barred: *C. phasianinus.*
Wing black, not patterned: 2.
2 Larger, tail more than 325 mm: *C. menbeki.*
Smaller, tail less than 275 mm: 3.
3 Upperparts blackish purple (Kordo Island only): *C. chalybeus.*
Upperparts dark oil-green: *C. bernsteinii.*

### *Centropus menbeki* (Lesson)

Greater Coucal. Length 22–27 in. Adults: generally deep oil-green to purplish blue-black, becoming brownish black on abdomen; contour feathering very coarse with bristle-like tips on forehalf of body; iris blood-red; bill horn-white with a black base; feet blackish grey. Wing 218–36 mm, tail 330–65 mm, exposed culmen 40–48 mm, tarsus 55 mm. Immature: black, but tail barred with rufous; iris tan.

RANGE Aru Islands, western Papuan Islands, New Guinea; from sea level to 2,600 ft.

SUBSPECIES Three similar ones:

a) *aruensis* (Salvadori); Aru Islands; upperparts generally dark purplish black.
b) *menbeki* (Lesson); western Papuan Islands, Salawati, Batanta and New Guinea; like *aruensis* but generally darker, more oil-green and somewhat smaller.
c) *jobiensis* (Stresemann and Paludan); Japen Island, Geelvink Bay; like *aruensis* but less purplish, more greenish above.

NESTING An egg removed from an oviduct was white; size 37 × 30·3 mm.

REMARKS This is a common species in the lowland forests, forest edges and tree-studded clearings, where it is usually found on the ground or climbing and hopping awkwardly and silently about in the low underbrush. The birds have a variety of gurgling and booming calls. Sometimes the species is very shy and retiring, and very difficult to see. The food includes large insects, small snakes, frogs, and small birds.

### *Centropus chalybeus* (Salvadori)

Biak Island Coucal. Length 18 in. Adults: generally dark purplish black to deep oil-green, becoming dark brown on abdomen; feathering of

1



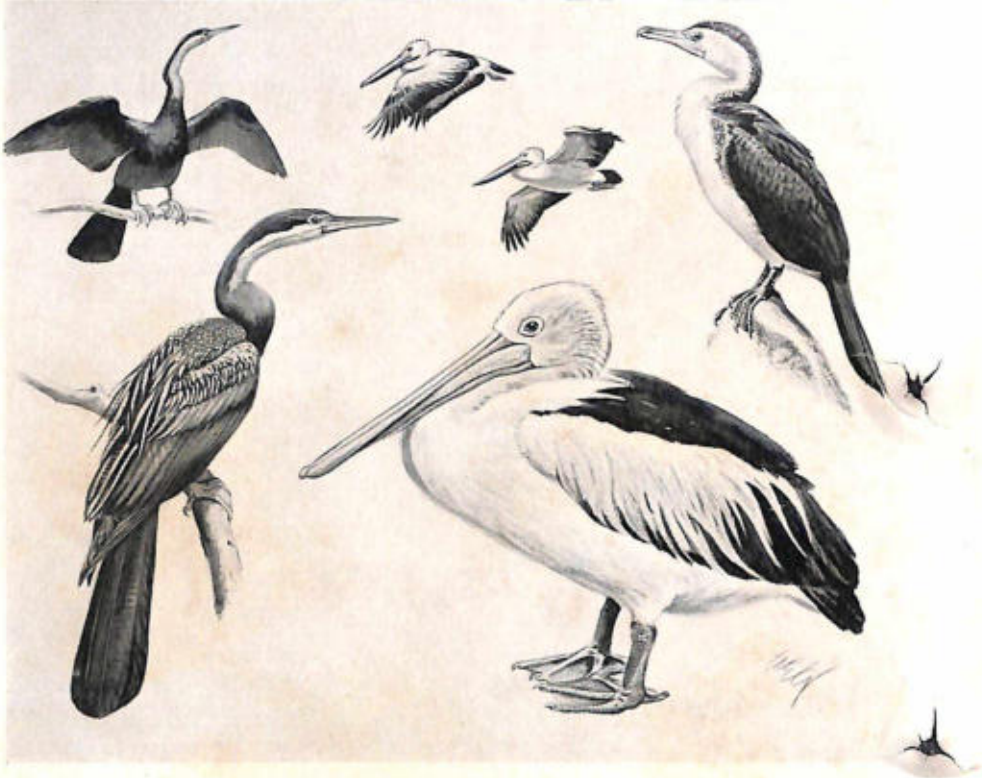
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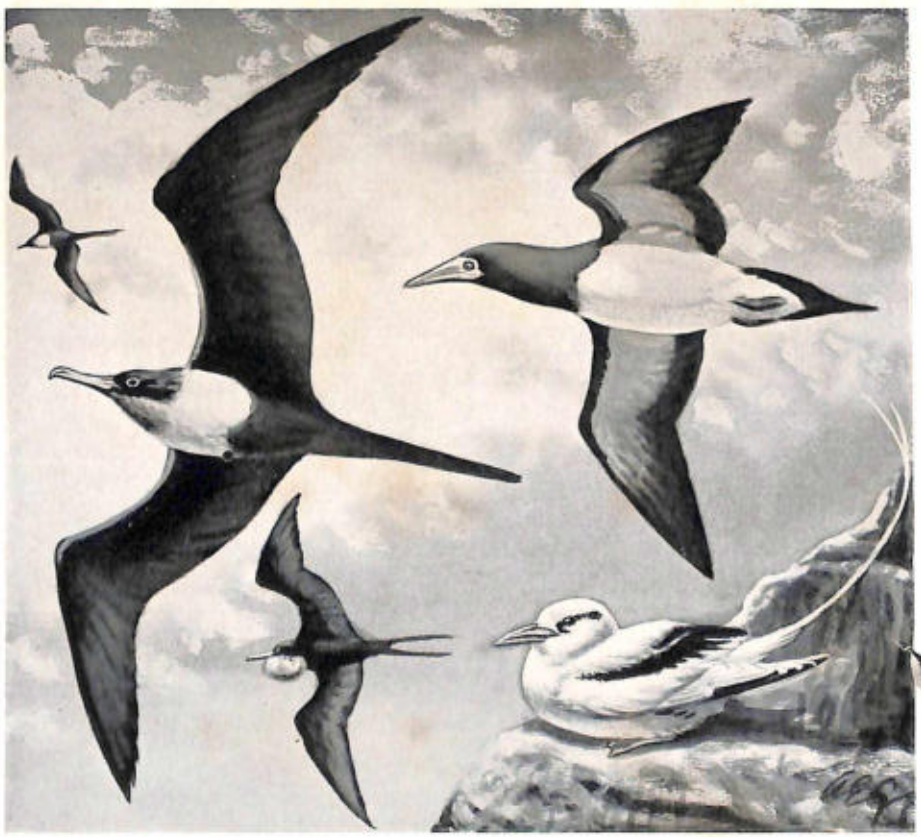
1 *Casuarius unappendiculatus*, Single-wattled Cassowary.

2 *Podiceps novaehollandiae*, Little Grebe.

3



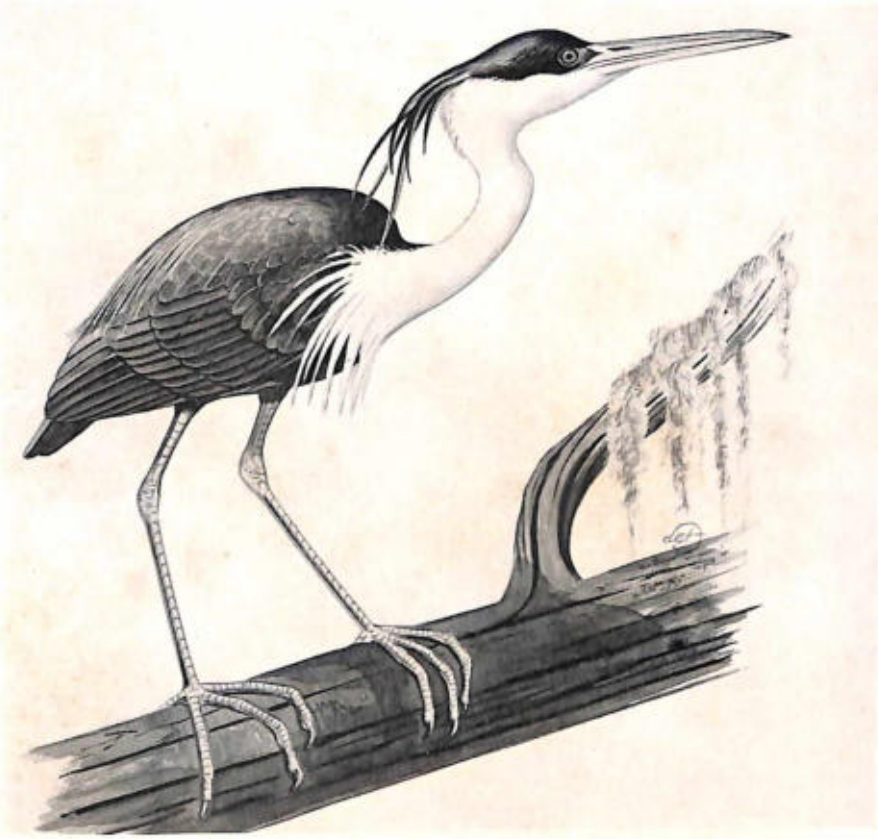
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3 (a) *Pelecanus conspicillatus*, Australian Pelican (centre) (b) *Phalacrocorax melanoleucos*, Little Pied Cormorant (top right) (c) *Anhinga rufa*, Australian Darter (left).

4 (a) *Sula leucogaster*, Brown Booby (top right) (b) *Fregata minor*, Greater Frigate-bird. (left) (c) *Phaethon lepturus*, White-tailed Tropicbird (bottom right).

5



6



5 *Notophoyx picta*, Pied Heron.

6 *Xenorhynchus asiaticus*, Jabiru.

7 *Plegadis falcinellus*, Glossy Ibis.

8 *Salvadorina waigiuensis*, Salvadori's Teal.

7



8



9 *Henicopernis longicauda*, Long-tailed Buzzard.

10 *Folco berigora*, Brown Falcon.

9



10





11



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11 *Aepypodius arfakianus*, Wattled Brush Turkey.

12 *Anurophasis monorthonyx*, Snow Mountain Quail.

13 *Turnix maculosa*, Black-backed Bustard-quail.

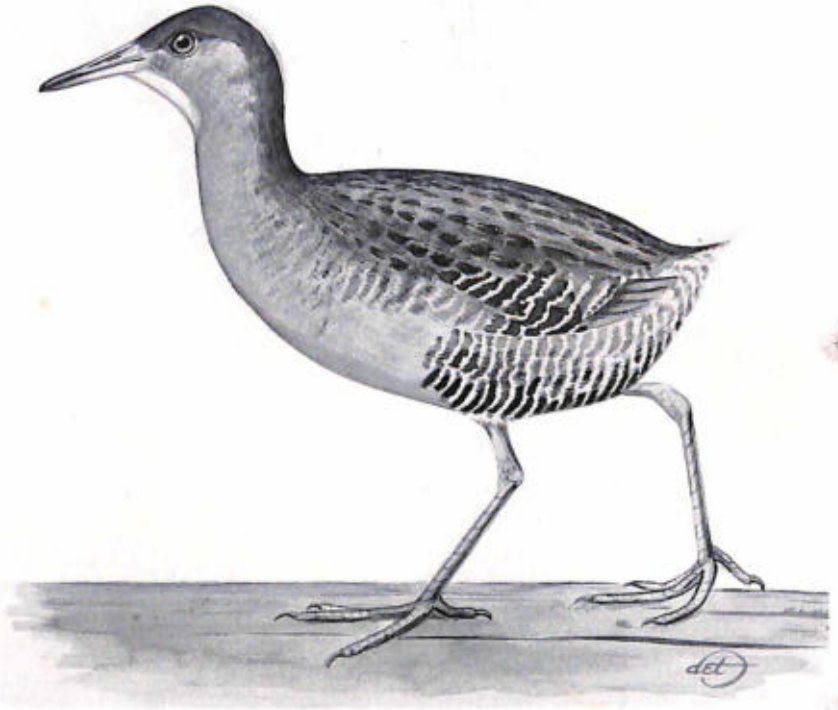
14 *Grus rubicunda*, Australian Crane.



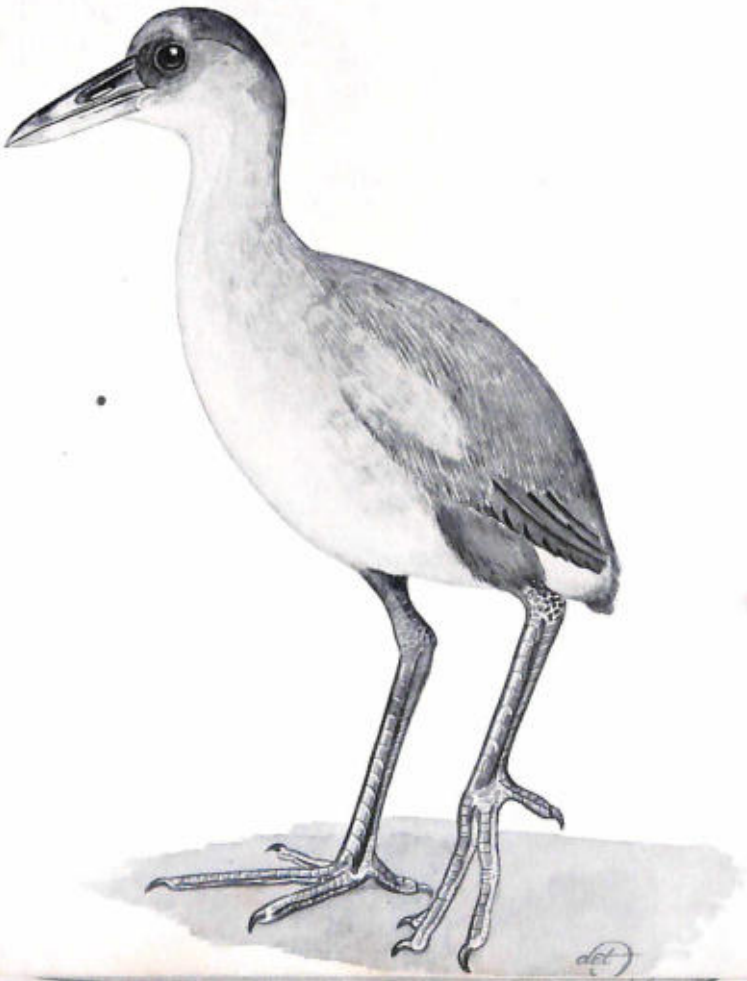
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15 *Rallus pectoralis*, Slate-breasted Rail.

16 *Megacrex inepta*, New Guinea Flightless Rail.

17 *Choriotis australis*, Australian Bustard.

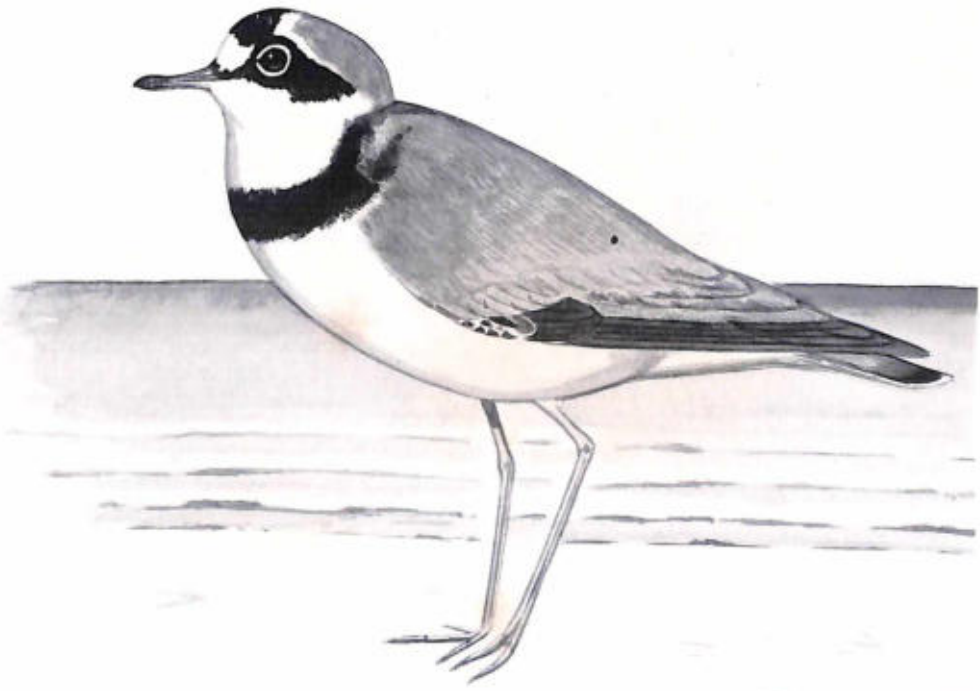


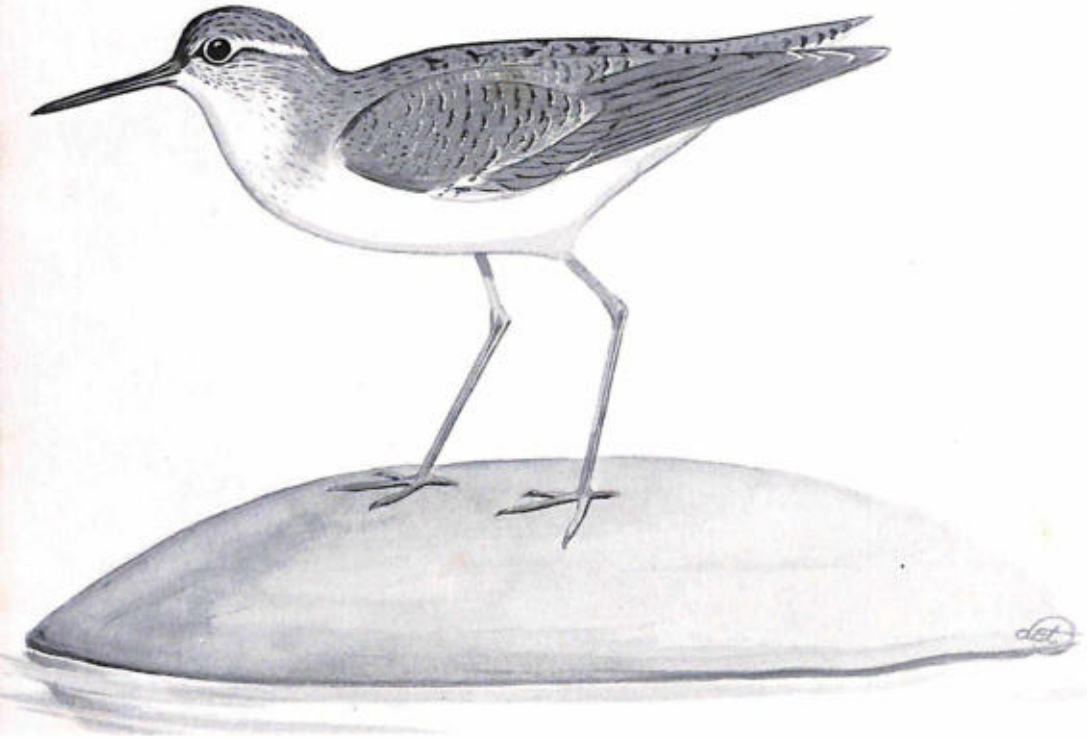
18 *Irediparra gallinacea*, Jacana.

19 *Haematopus ostralegus*, Pied Oystercatcher.

20 *Charadrius dubius*, Little Ringed Plover.







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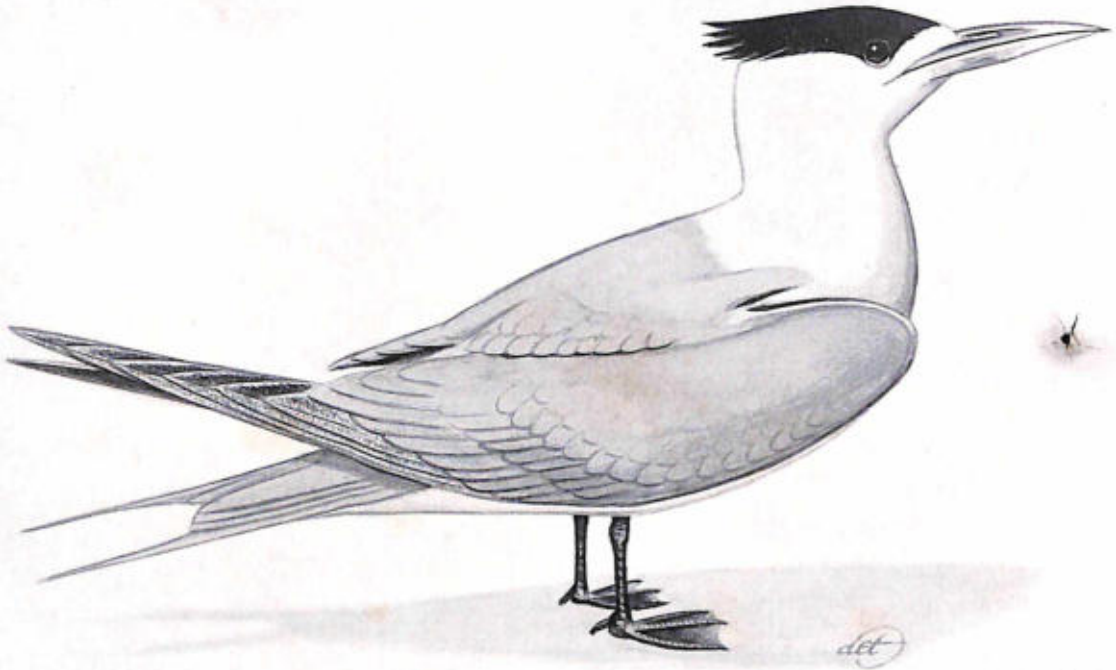
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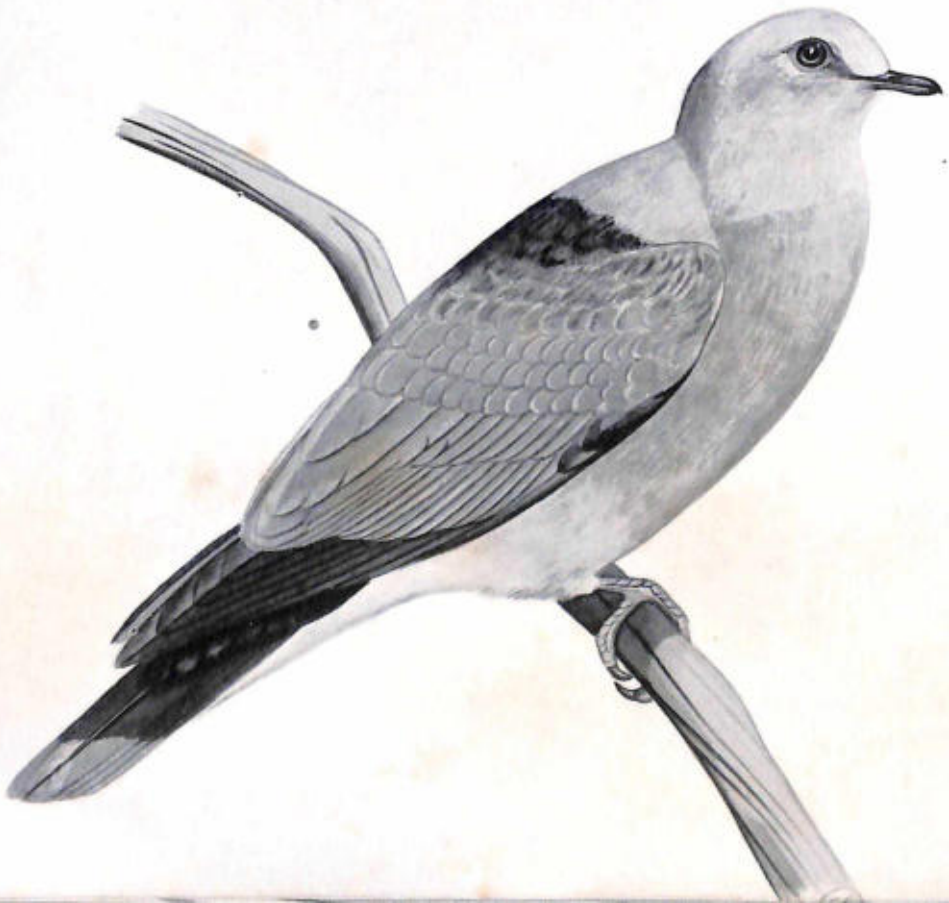


21 *Actitis hypoleucos*, Common Sandpiper.

22 *Esacus magnirostris*, Beach Stonecurlew.

23 *Stiltia isabella*, Australian Pratincole.







24 *Sterna bergii*, Greater Crested Tern.

25 *Ducula rufigaster*, Purple-tailed Imperial Pigeon.

26 *Reinwardtoena reinwardtsi*, Great Cuckoo-dove.

27



27 *Goura victoria*, Victoria Crowned Pigeon.

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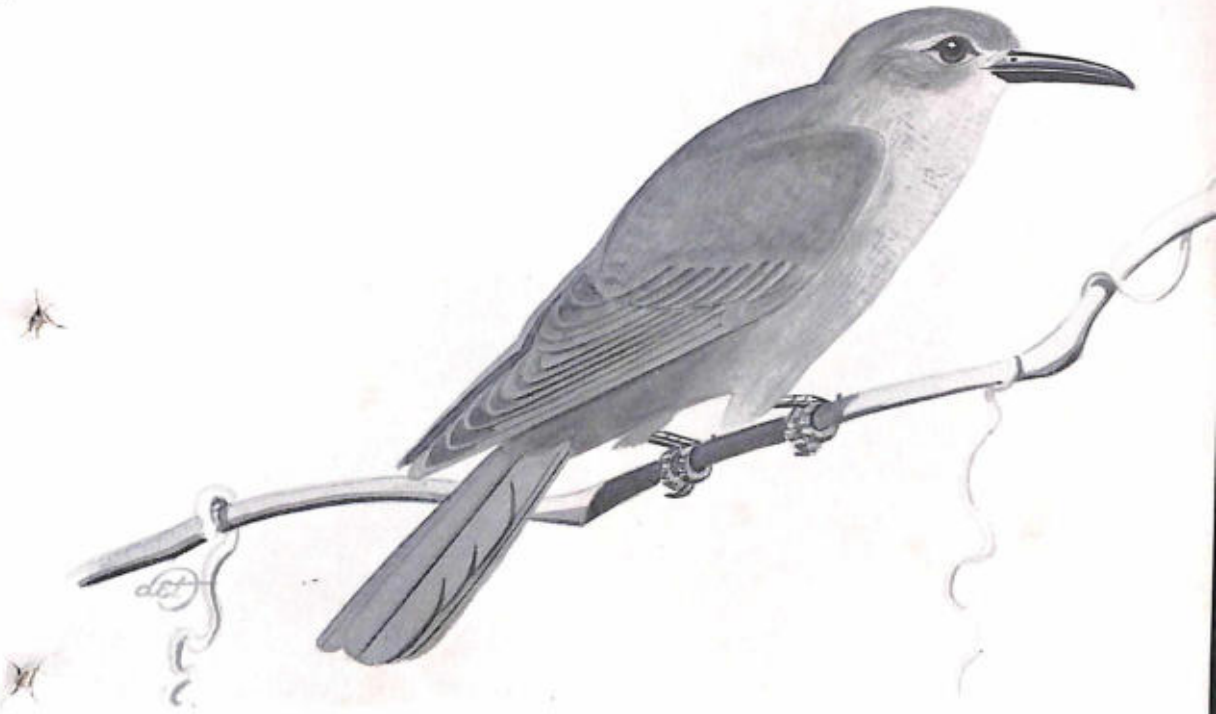
28 *Probosciger aterrimus*, Palm Cockatoo.

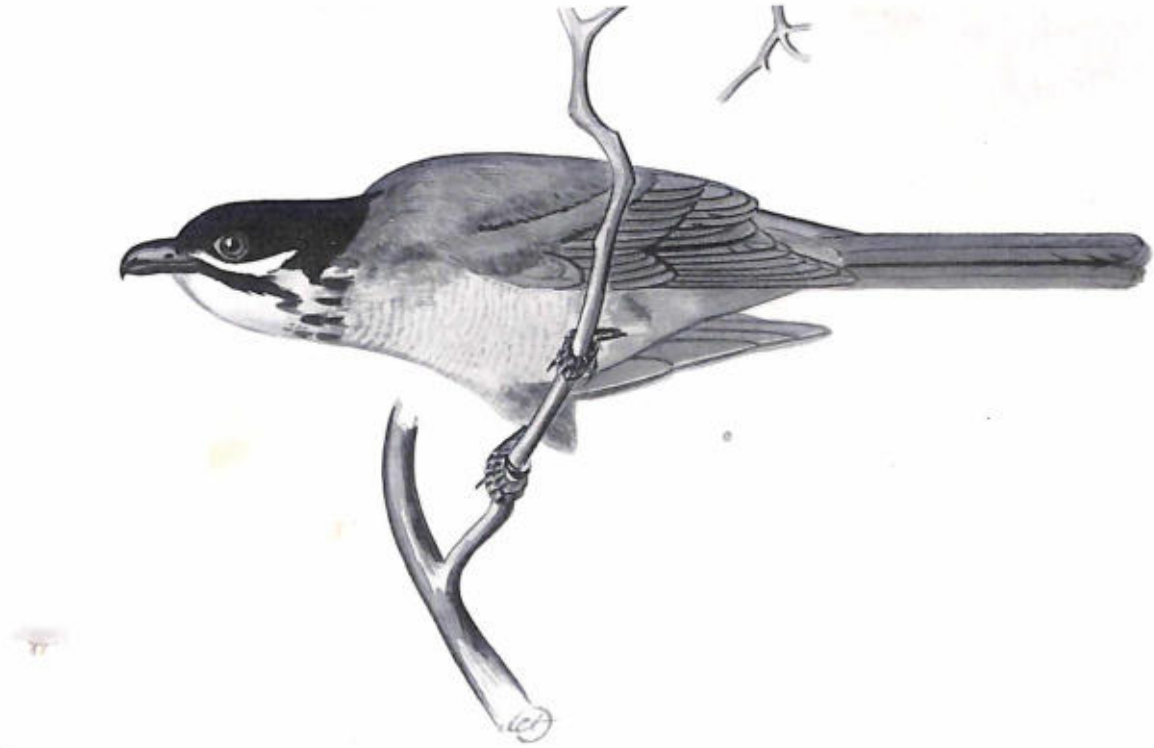
29 *Psittrichas fulgidus*, Vulturine Parrot.



30 *Micropsitta pusio*, Buffy-faced Pygmy Parrot.

31





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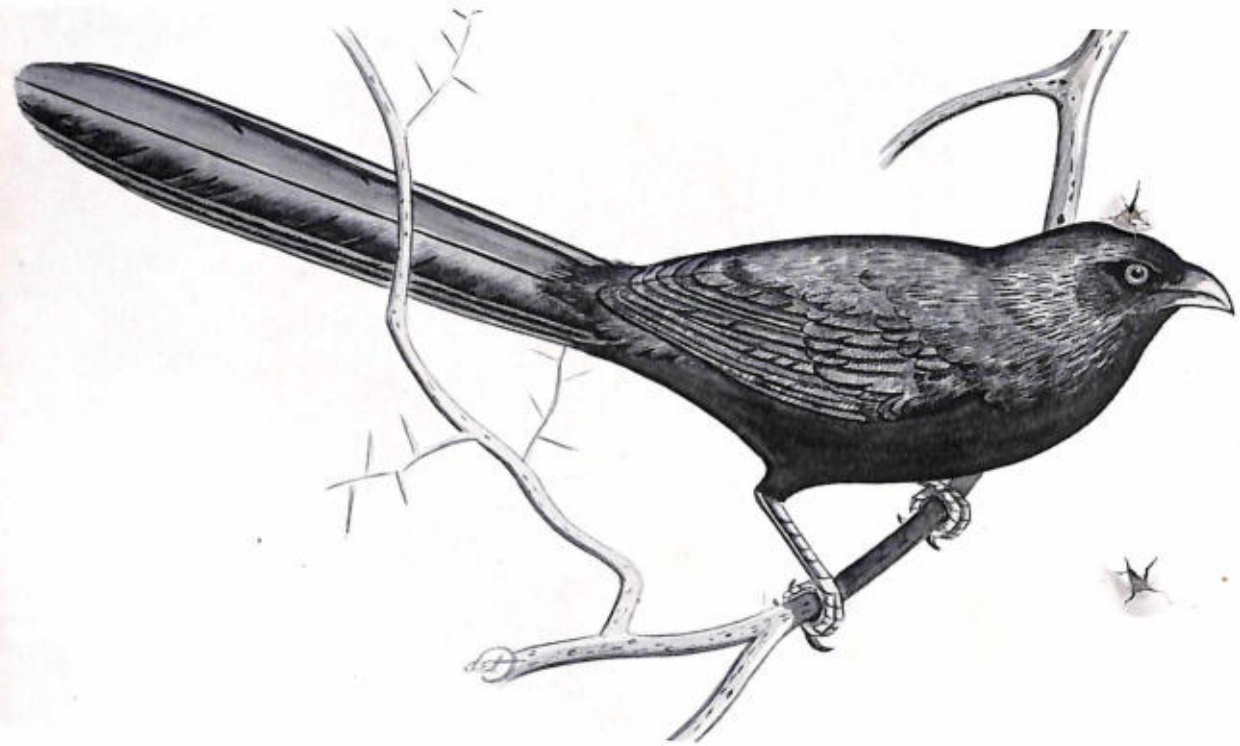
31 *Rhamphomantis megarhynchus*, Little Long-billed Cuckoo.

32 *Microdynamis parva*, Black-capped Cuckoo.

33 *Centropus menbeki*, Greater Coucal.

34 (a) *Tyto tenebricosa*, Sooty Owl (left) (b) *Ninox theomacha*, Brown Owl (right).

33



34





35 *Podargus papuens*
Great Papuan
Frogmouth.



36 *Aegotheles insignis*
Large Owlet-nightja

37 *Eurostopodus papuensis*, Papuan Nightjar.

38 *Collocalia esculenta*, Glossy Swiftlet.

38



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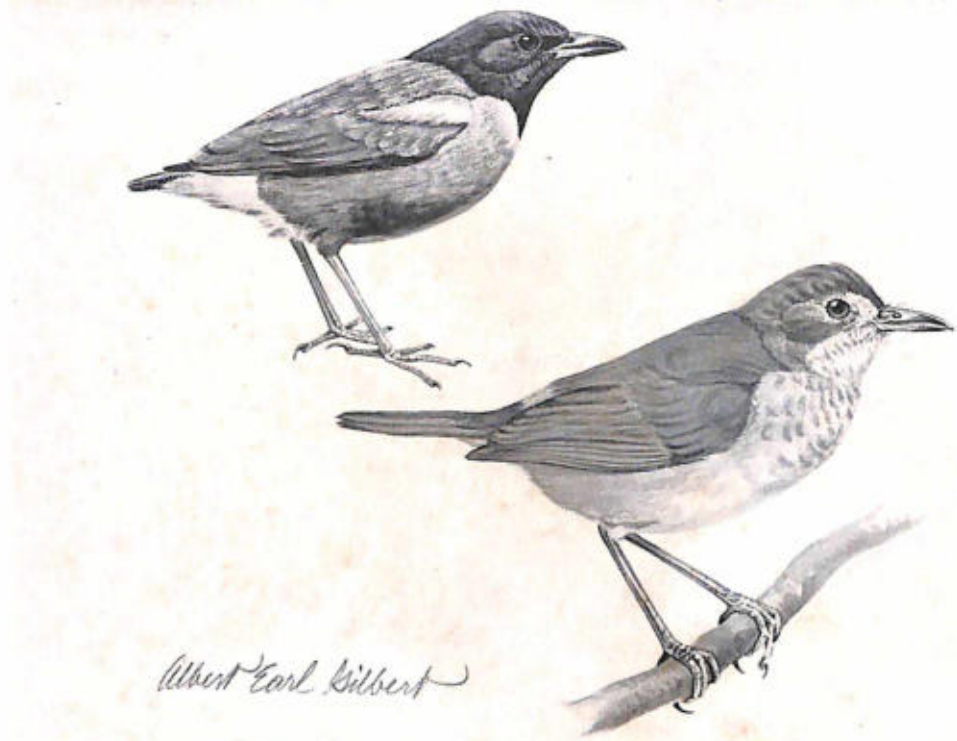
40



39 *Hemiprocne mystacea*, Moustached Swift.

40 *Halcyon megarhynchus*, Mountain Yellow-billed Kingfisher.

44




45



44 (a) *Pitta sordida*, Black-headed Pitta (top) (b) *Amalocichla sclateriana*, Greater New Guinea Thrush (bottom).

45 (a) *Anthus gutturalis*, New Guinea Pipit (top) (b) *Motacilla cinerea*, Grey Wagtail (bottom left) (c) *Mirafra javanica*, Bush Lark (bottom right).

46



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46 *Hirundo nigricans*, Tree Martin.

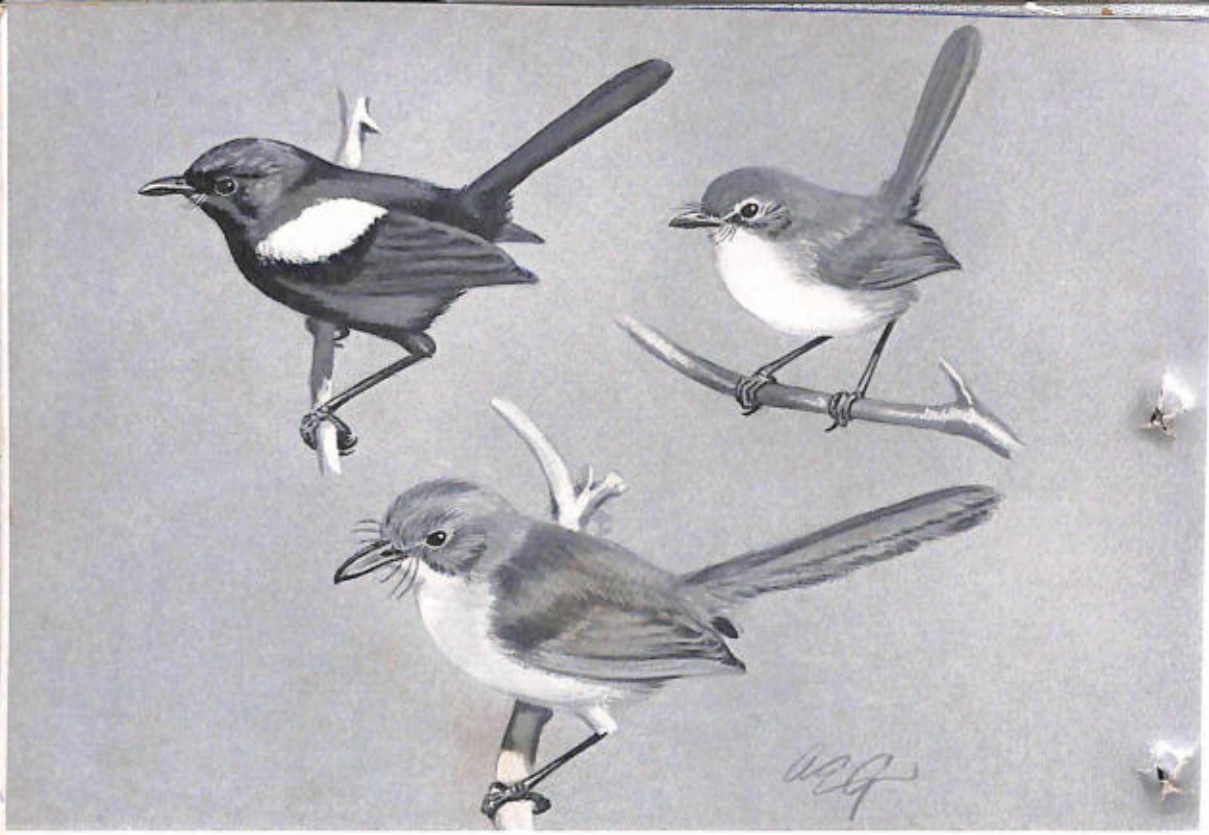
47 (a) *Lalage atrovirens*, Black-browed Triller(left) (b) *Coracina papuensis*, Papuan Greybird (right).

48 (a) *Androphobus viridis*, Green-backed Babbler (top left) (b) *Crateroscelis nigrorufa*, Mid-mountain Mouse-babbler (top right) (c) *Orthonyx temminckii*, Logrunner (bottom left) (d) *Melampitta lugubris*, Lesser Melampitta (bottom right).

49 (a) *Pomatostomus isidori*, Rufous Babbler (top) (b) *Cinclosoma ajax*, Ajax Scrub Robin (bottom).







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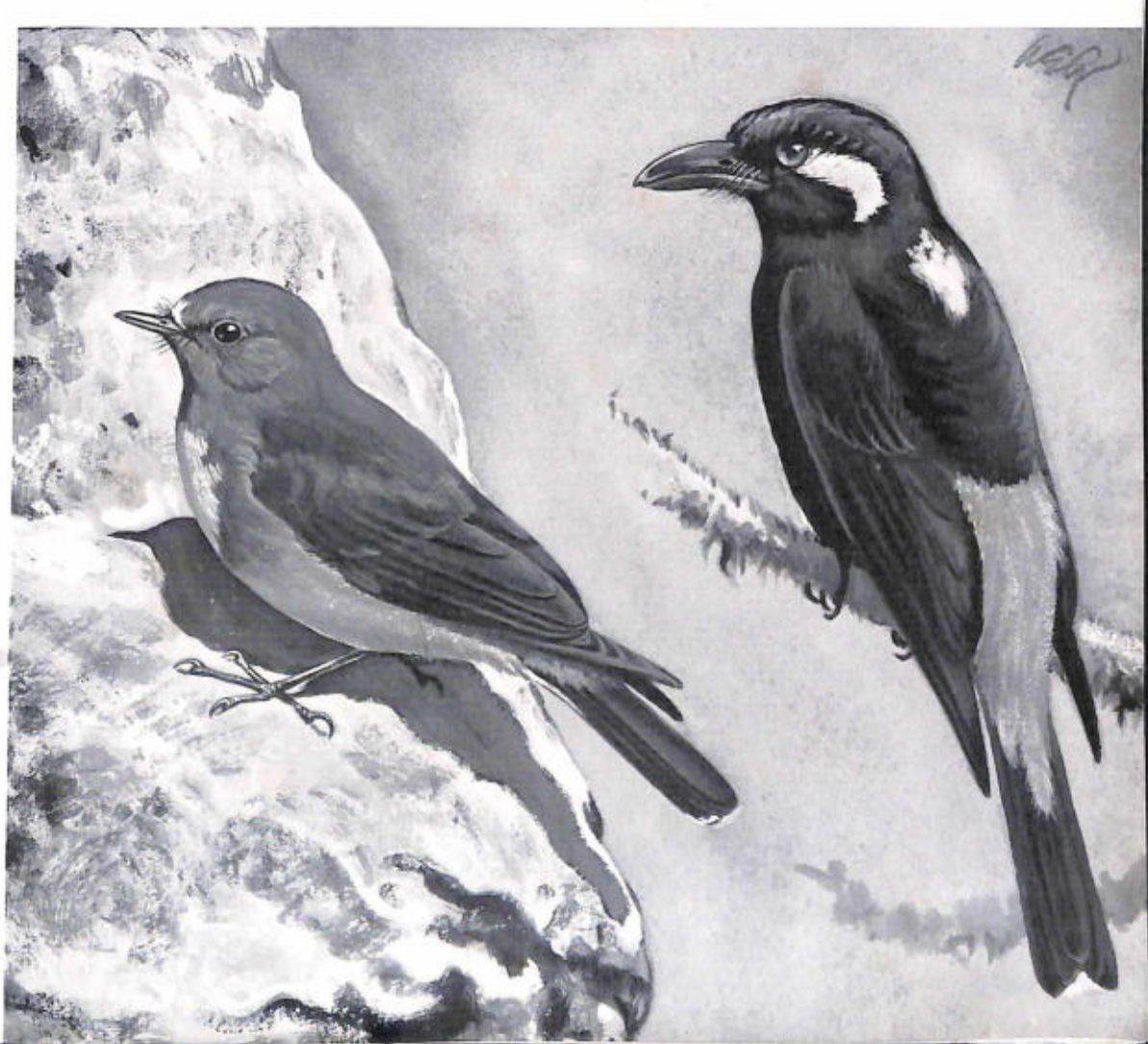
50 (a) *Malurus alboscapulatus*, Black and White Wren Warbler: male (top left).
(b) *Molurus alboscapulatus*, Black and White Wren Warbler; female (top right).
(c) *Clytomyias insignis*, Rufous Wren Warbler (bottom).

51 (a) *Cisticola exilis*, Fantail Warbler (top) (b) *Megalurus albolimbatus*, Fly River Grass Warbler (bottom).

52 (a) *Gerygone magnirostris*, Swamp Gerygone Warbler (top) (b) *Sericornis beccarii*, Beccari's Sericornis (bottom).

53 (a) *Petroica archboldi*, Rock Robin Flycatcher (left) (b) *Peltops blainvillii*, Lowland Peltops Flycatcher (right).







54 (a) *Microeca papuana*, Papuan Microeca Flycatcher (top left) (b) *Monarcha frater*, Black-winged Monarch Flycatcher (right) (c) *Monachella mulleriana*, River Flycatcher (bottom left).

55 (a) *Rhipidura albolimbata*, Friendly Fantail (top) (b) *Machaerirhynchus nigripectus*, Black-breasted Flatbill Flycatcher (bottom).

56 (a) *Peneothello sigillatus*, White-winged Thicket-flycatcher (top) (b) *Poecilodryas albonotata*, Black-throated Flycatcher (bottom).



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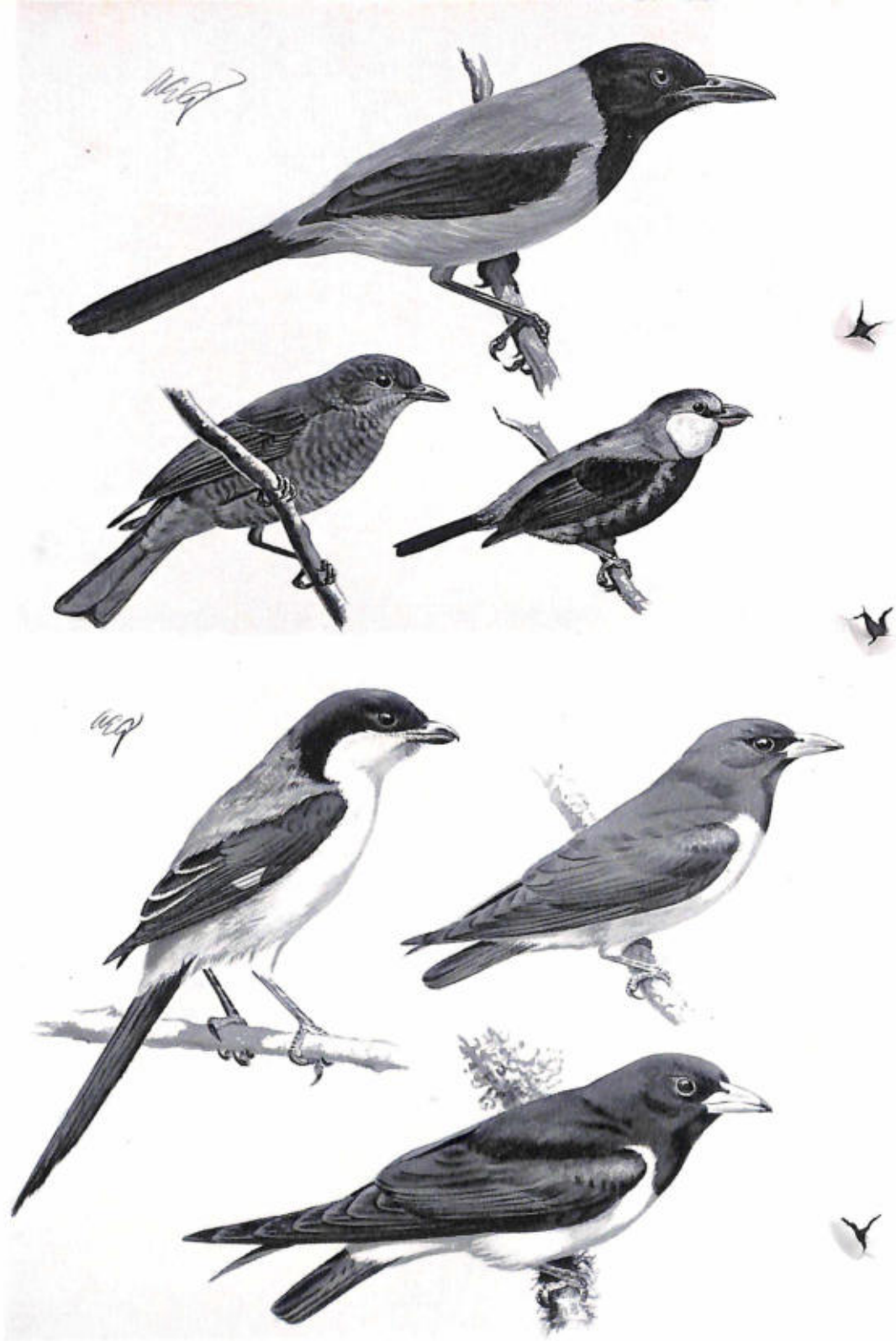
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57 (a) *Pachycephalopsis poliosoma*, White-throated Thicket-flycatcher (top)
(b) *Heteromyias albispecularis armati*, Ground Thicket-flycatcher (bottom).




58 (a) *Pachycare flavogrisea*, Golden-faced Pachycare (top left)
(b) *Myiolestes megarhynchus*, Brown Shrike-flycatcher (bottom left)
(c) *Pachycephala soror*, Sclater's Whistler: male (centre right).



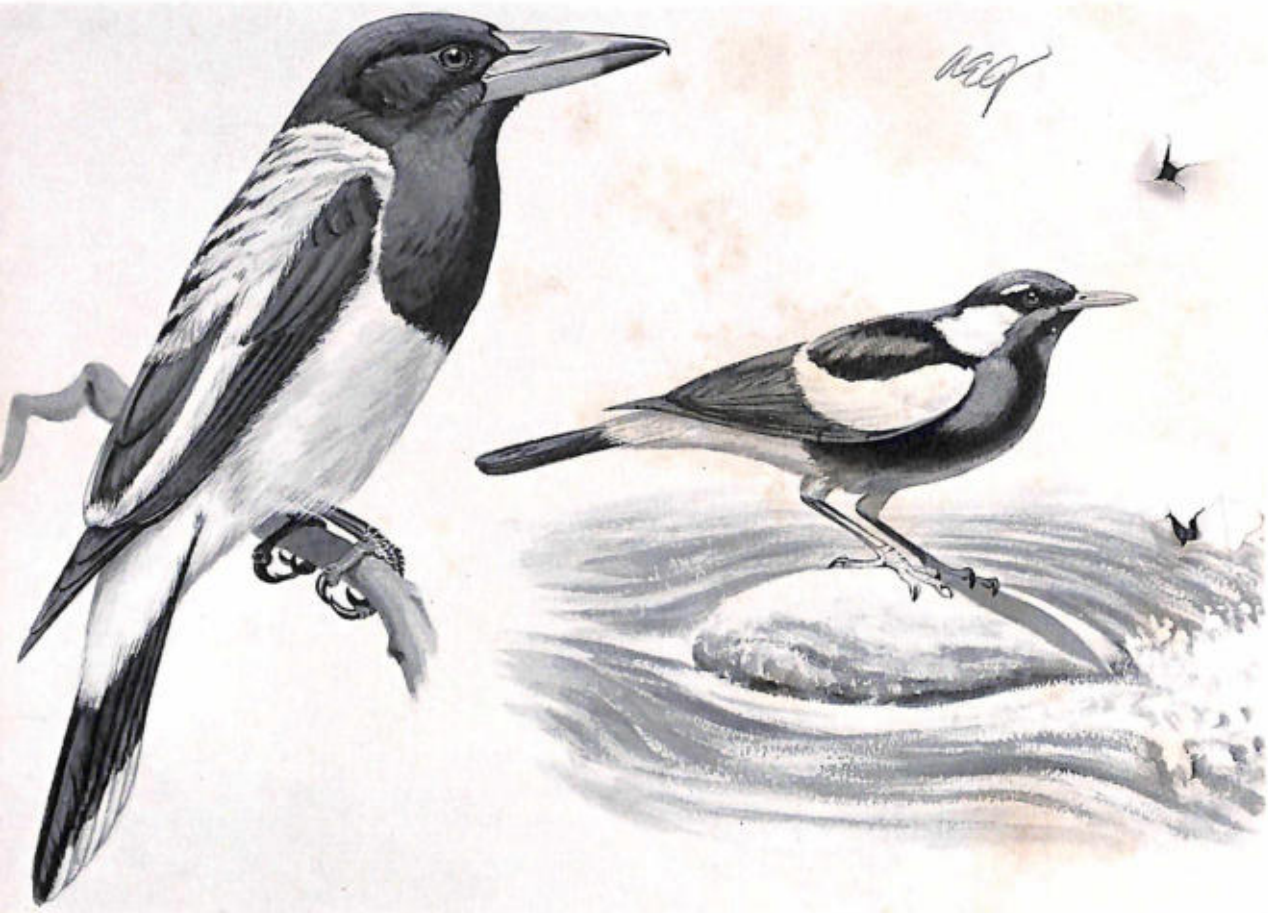
59 (a) *Pitohui dichrous monticola*, Black-headed Pitohui (top) (b) *Rhagologus leucostigma*, Mottled Whistler (bottom left) (c) *Eulacestoma nigropectus*, Wattled Shrike-tit: male (bottom right).

60 (a) *Lanius schach*, Schach Shrike (top left) (b) *Artamus leucorhynchus*, Lesser Wood Swallow (top right) (c) *Artamus maximus*, Greater Wood Swallow (bottom).

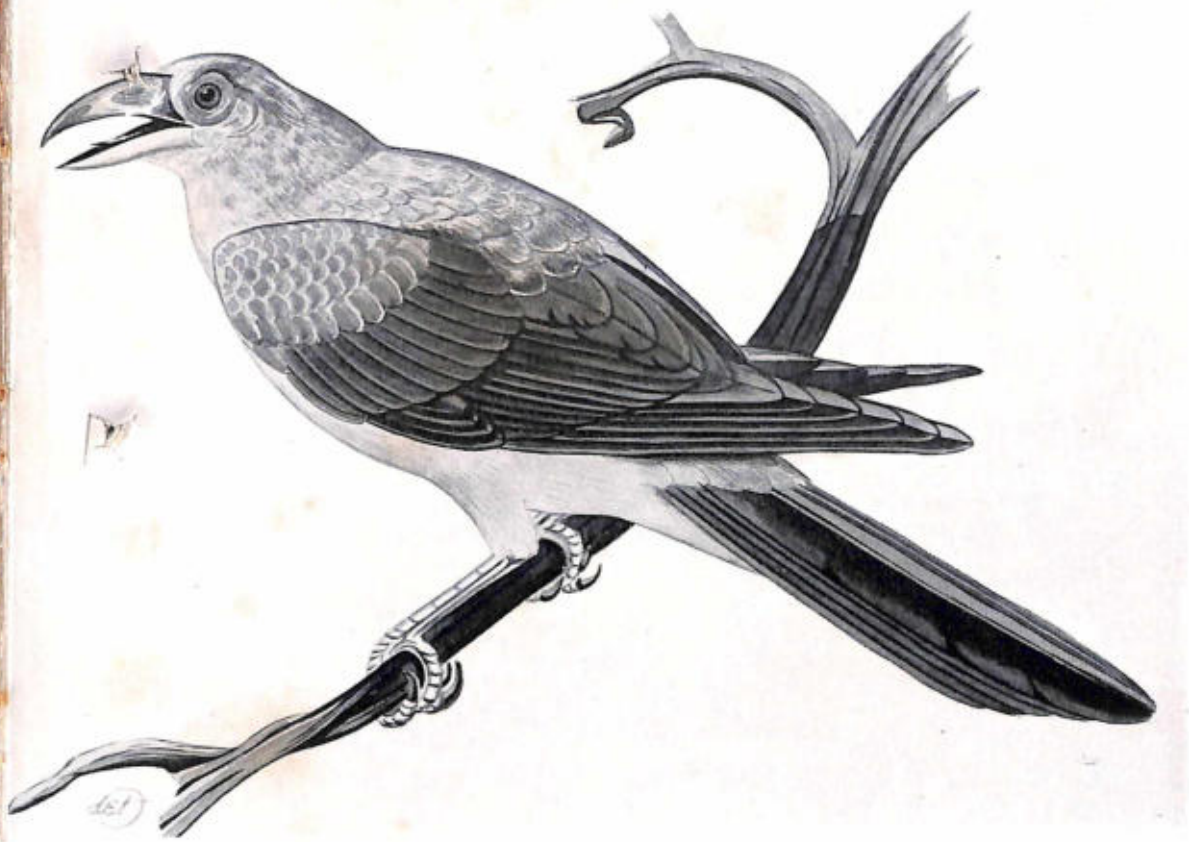


61 (a) *Aplonis mystacea*, Grant's Starling: adult (centre) (b) *Aplonis mystacea*, Grant's Starling: immature (left) (c) *Mino anais orientalis*, Golden-breasted Myna (right).

62 (a) *Chaetorhynchus papuensis*, Mountain Drongo (top left) (b) *Dicrurus hottentotus*, Spangled Drongo (top right) (c) *Oriolus szalayi*, Brown Oriole (bottom left).



63 (a) *Cracticus cassicus*, Black-headed Butcherbird (left)
(b) *Pomareopsis bruijni*, Torrentlark (right).



64 *Gymnocorvus tristis*, Grey Crow.

65 (a) *Manucodia chalybatus*, Green-breasted Manucode (top) (b) *Parotia wahnesi*, Wahnes' Six-wired Parotia (bottom).

66 (a) *Macgregoria pulchra*, MacGregor's Bird of Paradise (left) (b) *Paradigalla brevicauda*, Short-tailed Paradigalla (right).

65



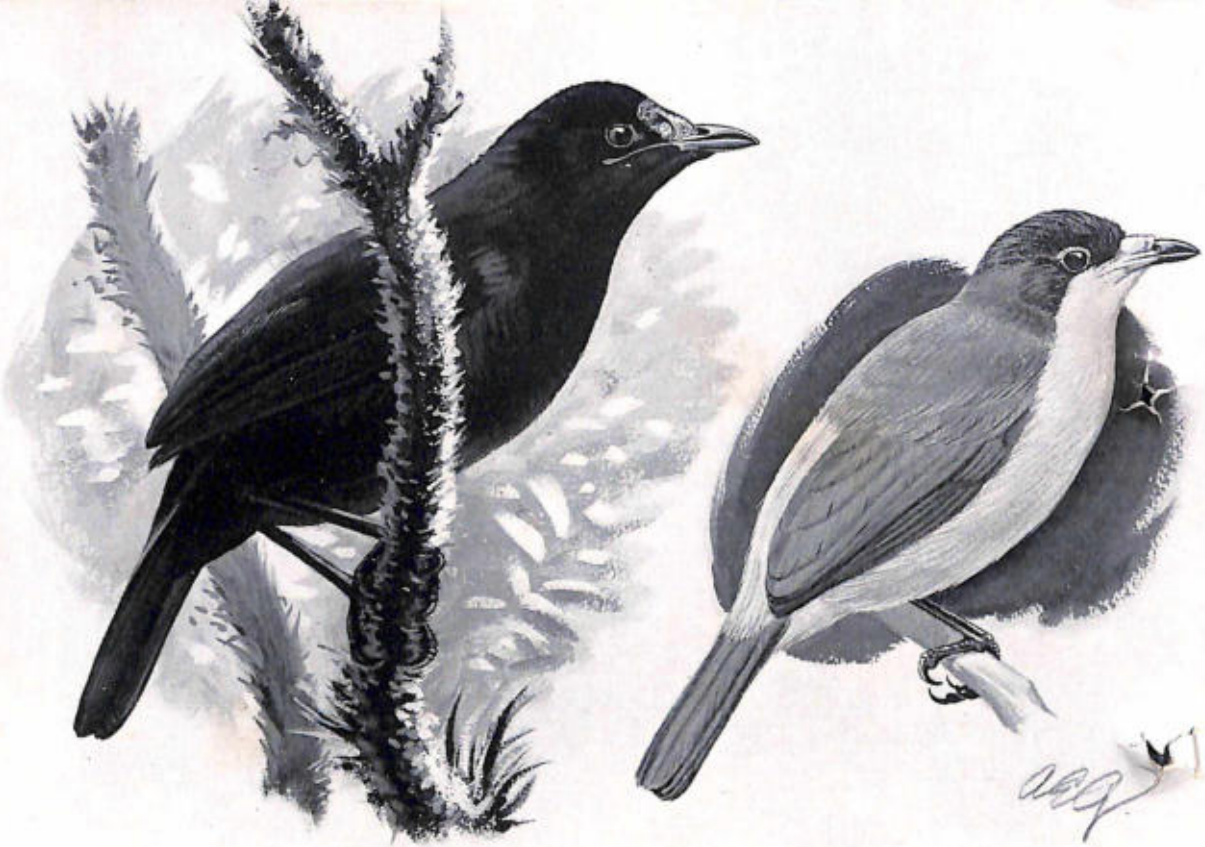

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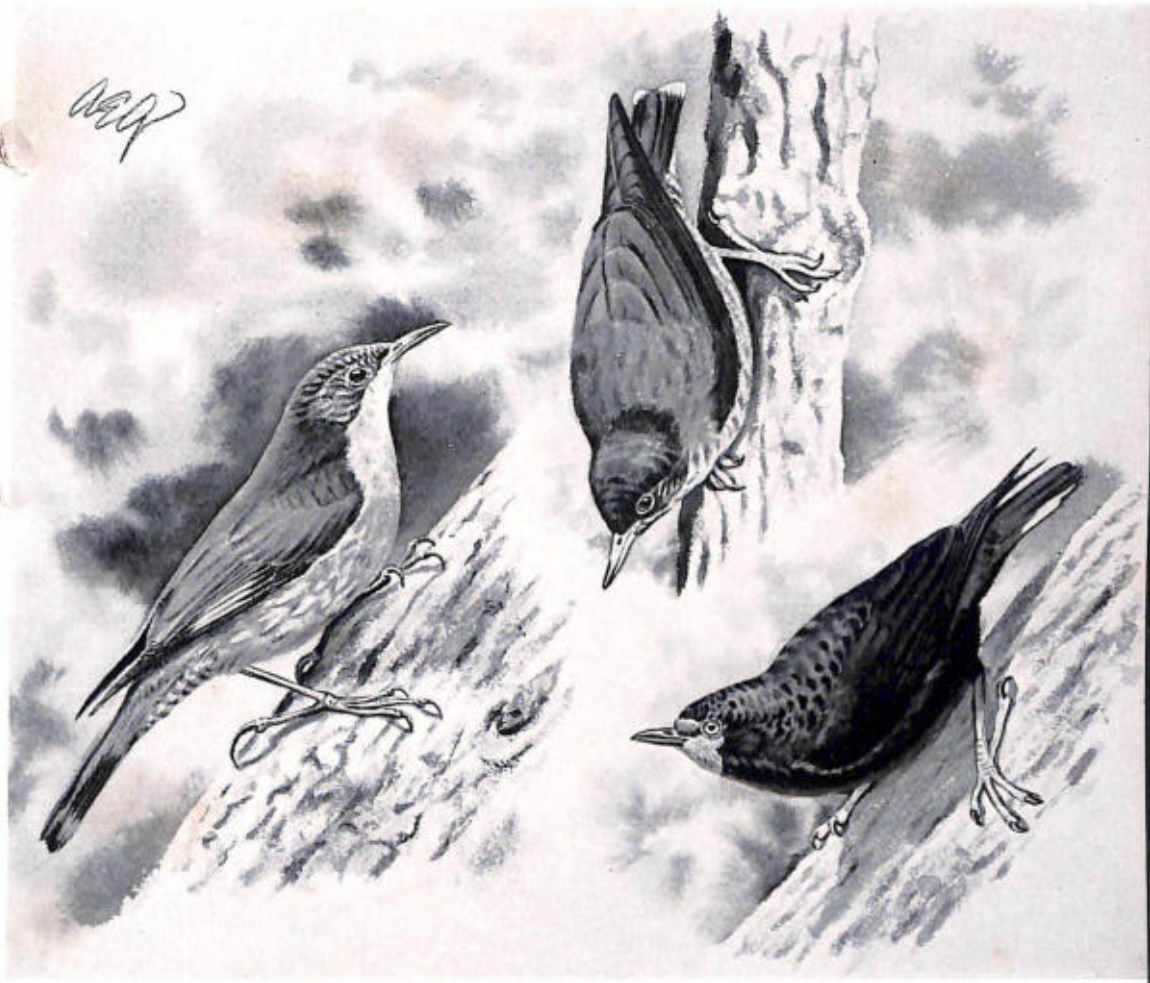
67 (a) *Diphyllodes magnificus*, Magnificent Bird of Paradise: female (top)
(b) *Paradisaea raggiana*, Raggiana Bird of Paradise: female (bottom).











68 (a) *Loria loriae*, Loria's Bird of Paradise (left)
(b) *Loboparadisea sericea*, Yellow-breasted Bird of Paradise (right).

69 *Amblyornis subalaris*, Striped Bowerbird.

70 (a) *Climacteris placens*, Papuan Creeper (left)
(b) *Neositta papuensis*, Papuan Sittella (centre)
(c) *Daphoenositta miranda*, Pink-faced Nuthatch (bottom right).

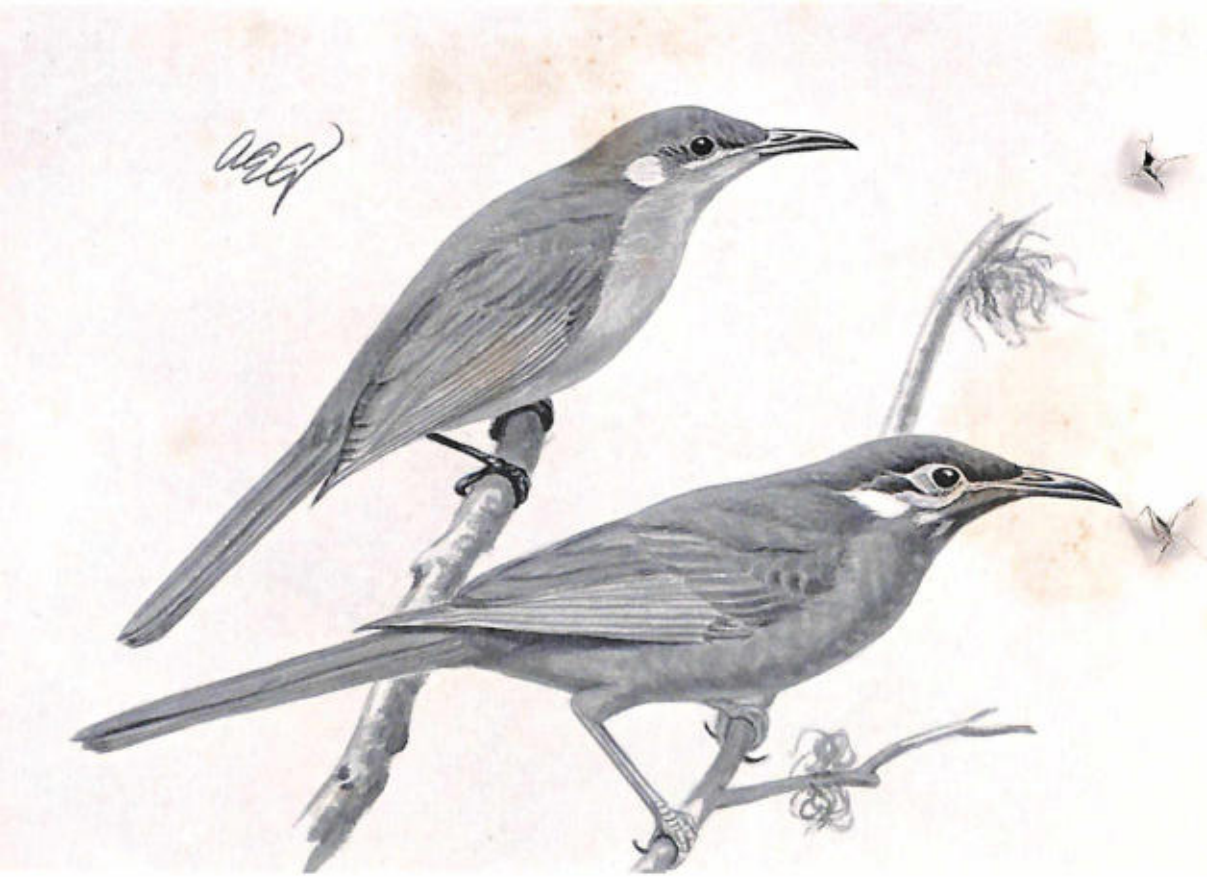




71 (a) *Nectarinia jugularis*, Yellow-bellied Sunbird: male (top) (b) *Zosterops minor*, Black-fronted White-eye (bottom).

72 (a) *Timeliopsis fulvigula*, Mountain Straight-billed Honeyeater (bottom left) (b) *Ramsayornis modestus*, Modest Honeyeater (top left) (c) *Oedistoma pygmaeum*, Pygmy Honeyeater (top right) (d) *Conopophila albogularis*, Rufous-breasted Honeyeater (bottom right).

73 (a) *Melidectes torquatus*, Cinnamon-breasted Wattlebird (top left) (b) *Xanthotis polygramma*, Spotted Xanthotis (top right) (c) *Ptiloprora guisei umbrosa*, Red-backed Honeyeater (bottom).



74 (a) *Meliphaga analoga*, Mimic Meliphaga (top)
(b) *Oreornis subfrenatus*, Black-throated Honeyeater (bottom).



75 (a) *Rhamphocharis crassirostris*, Spotted Berrypecker: female (top left)
(b) *Rhamphocharis crassirostris*, Spotted Berrypecker: male (top right)
(c) *Melanocharis versteri*, Fan-tailed Berrypecker (bottom left)
(d) *Dicaeum geelvinkianum*, Red-capped Flowerpecker (bottom right).



76 (a) *Erythrura papuana*, Papuan Parrot-finch (top left)
(b) *Neochmia phaeton*, Crimson Finch (top right)
(c) *Lonchura spectabilis*, New Britain Mannikin (bottom left; upper)
(d) *Lonchura castaneothorax*, Chestnut-breasted Mannikin (bottom left; lower)
(e) *Oreostruthus fuliginosus*, Crimson-sided Mountain Finch (bottom right).

forepart of body somewhat spiny; iris yellow; bill solid black. Wing 200–9 mm, tail 258 mm, exposed culmen 45 mm, tarsus 49 mm.

RANGE Islands of Geelvink Bay (Biak and (?) Numfor).

REMARKS Confined to thick secondary growth; call: a loud, guttural, hollow note repeated over and over (Ripley). Apparently not uncommon on Biak Island.

***Centropus bernsteinii* (Schlegel)**

Bernstein's Coucal. Length 16–20 in. Adults: generally dark oil-green to blackish; iris dark brown; bill and feet black. Male wing 168–280 mm, tail 250–70 mm, exposed culmen 28–35 mm, tarsus 40–48 mm. Immatures: upperparts profusely barred with rufous; wings and tail narrowly barred with buff to pale chestnut-brown; throat whitish; neck all round marked with chestnut-brown; central abdomen grey with dark bars; rest of underparts blackish brown with narrow pale barring; iris grey; bill tan to brown; feet grey.

RANGE New Guinea. Sea level up to 1,500 ft.

SUBSPECIES Two similar ones:

a) *manam* (Mayr); Vulcan (Manam) Island.
b) *bernsteinii* (Schlegel); Salawati Island (?) and west New Guinea, east in north to Huon Peninsula and east in south to Fly River.

NESTING A nest was found in the edge of an area of cane grass placed among the stems of the grass, supported on all sides by them. Nest: a smooth oval structure with an irregular, untidy opening on the side; composed of large, dry, flat leaves of grass; eggs two; size 32 × 26 mm.

REMARKS Bernstein's Coucal was not uncommon in and about second growth and adjacent cane grass fields bordering waterways; but shy and difficult to observe.

***Centropus phasianinus* (Latham)**

Common Coucal. Length 17–23½ in. Adults: upperparts dark greyish brown to blackish or greenish black, usually with feathers on forepart of body and wing-coverts with ivory-white shafts; wing-coverts and wing quills spotted and barred with variable amounts of buff to reddish brown; tail brownish black with some pale narrow barring; underparts irregularly greyish brown to black; iris dark red; bill black; feet slate-grey. Male wing 195–222 mm, tail 270–315 mm, exposed culmen 30 mm, tarsus 43 mm. Female: somewhat larger, wing up to 255 mm.

RANGE Australia, eastern New Guinea and D'Entrecasteaux Archipelago.

SUBSPECIES IN NEW GUINEA Four well-marked ones:

a) *thierfelderi* (Stresemann); southern New Guinea between Merauke and Fly River; wing quills broadly barred and shafted with reddish brown; head and underparts blackish.
b) *nigricans* (Salvadori); south coast of south-eastern New Guinea from Hall Sound eastward; like *thierfelderi* but markings on wing quills narrower and less brightly coloured.
c) *obscuratus* (Mayr); D'Entrecasteaux Archipelago (Fergusson and Goodenough Islands) and coasts of south-eastern New Guinea from East Cape to Huon Gulf; like *thierfelderi* but more blackish, less brownish and with barring of wings and tail quills much reduced.
d) *propinquus* (Mayr); northern New Guinea between Astrolabe Bay and Humboldt Bay; like *thierfelderi* but barring of wing quills much reduced and paler, more buff, less reddish brown.

NESTING [Nest: globular, about 14 in. in width and height, in a grass tussock, composed of grass and twigs, entrance at side and often with a stick extension tube. Eggs three to five, white; size 36·5 × 28·5 mm. Both sexes incubate the eggs. Australian data.]

REMARKS A common lowland species found in the forest edge, thickets and grasslands, and at Rona near Port Moresby, not infrequently encountered walking about in the open grasslands. Thus it is much less shy and retiring than the other coucals of New Guinea. Its call is a loud, bubbling 'ko' rapidly repeated, and it has an alarm note, a sharp 'tschew'. Its food is chiefly insects and occasionally frogs.

# Order 14 Strigiformes

## Owls and Barn Owls

*Two families*

Owls are nocturnal birds of prey with hooked bills and feet with curved talons for catching and tearing apart larger animal prey. However, many species are content with large insects for prey. Owls are, therefore, the night-flying ecological equivalent of the diurnal hawks. A characteristic of owls is the large round head with the eyes looking forward and surrounded by disks of feathers which give a very characteristic appearance. Owls usually have soft fluffy plumage and soft noiseless flight, and even tropical species usually have feathered legs.

Most owls are tree birds and spend the day asleep in a hole in a tree or on a shady perch, but a few species live in grasslands and rest on the ground or in a burrow in grassland. Owls are rarely seen, and as they have loud voices, many are better known by these. In Europe and America some owls 'hoot', but New Guinea species seem to give either shrieks or two-syllable cries. Additional studies, however, will undoubtedly modify this.

Owls lay white, roundish eggs. Eggs are often laid in a hollow tree, rock crevice, an old building, an old nest of some other bird, or in a few species on the ground. Very little actual nest is made. The downy young are cared for in the nest until they can fly.

Two related families are represented by ten species in New Guinea. The two families are keyed out together.

### Key to New Guinea Owls

1 (a) Underparts white or buffy, with small sparse black spots (sometimes almost absent): *Tyto* (part), 2.
(b) Underparts mostly sooty black, spotted with white: *Tyto tenebricosa*.
(c) Not as above, dark parts of plumage predominately brown: 3.

2 (a) Upperparts predominately uniform black with a few small white

spots; lesser upper wing-coverts contrasting orange buffy spotted black: *T. longimembris.*

(b) Upperparts predominately black coarsely variegated with buffy and marked with white: *T. novaehollandiae.*

(c) Upperparts predominately freckled grey variegated with buffy and with small spots of black and white: *T. alba.*

3 (a) With small ear tufts on each side of head; Biak Island only: *Otus beccarii.*

(b) Head round, without ear tufts: 4.

4 (a) Upper and underparts evenly barred; size large, 16–20 in.: *Ninox rufa.*

(b) Back barred; underparts white sharply streaked black; length 12–13 in.: *Uroglaux dimorpha.*

(c) Plumage without barring: *Ninox* (part), 5.

5 (a) Whole underparts whitish plentifully streaked brown: 6.

(b) Throat and upper breast at least uniform brown; rest of underparts variable nearly uniform to spotted and mottled with white: *N. theomacha.*

6 (a) Size larger, length over 12 in.; back dull brown: *N. conniveus.*

(b) Size smaller, length less than 12 in.; back red-brown: *N. novaeseelandiae.*

## Family Tytonidae *Barn Owls*

*(Eleven species, four in New Guinea)*

A family of nearly world-wide distribution. Four of the eleven species occur in New Guinea. They differ most obviously from other owls by the peculiar heart-shaped facial disk.

### *Tyto alba* (Scopoli)

Barn Owl. Length 12–13 in. Adults: pale, whitish birds; underparts including thighs and under wing pure white except for a few small scattered black spots on underside of body and sometimes on under wing-coverts; some obscure dark markings in tip of wing quills and sometimes in tail; facial disk white with a little brown in front of eye, and edged laterally with a little brown; upperparts finely patterned in grey-white and buffy with scattered black and white spots, and tail white with three obscure, broken black bars and some dusky freckling; iris brown; bill bluish white (yellow in skins); feet dusky. Male wing 285 mm, tail 110 mm, culmen 37 mm, tarsus 70 mm. Female wing 295 mm.

RANGE On all continents and many islands.

SUBSPECIES IN NEW GUINEA One, *meeki* (Rothschild and Hartert); south-eastern New Guinea west to Port Moresby and middle Sepik River, also Dampier (Karkar) and Vulcan (Manam) Islands; lowlands to 4,000 ft.

NESTING [In caves, old buildings, or hollow trees(?); eggs white.]

REMARKS As with all owls, there is much to be learned about this species which in Europe and North America is so intimately associated with old buildings and whose ordinary call, a shriek, appears so often in literature. The known distribution in New Guinea is peculiar, and it is said that an owl occurs on Biak in the deep forest and occasionally in the rafters of large houses (Ripley). No specimens have been taken there, and if the observations are accurate the population might be the Moluccan subspecies or related to it.

The species is usually a tree or cave bird and where rodents are plentiful tends to feed on them.

***Tyto novaehollandiae* (Stephens)**

Masked Owl. Length 15–17 in. Adults: underparts white (or with a buffy tinge) with sparse medium to small black spots on underside of body and under wing-coverts, and distinct dark bars on distal part of some wing quills; face disk white with brownish about eye, and edged with a distinct brown and black line; upperparts dark, intricately patterned with black, grey, buffy and white; wing quills conspicuously barred and freckled with blackish and orange-buff; tail with blackish bars (five to seven) and orange-buff (or white) and some freckling; iris brown; bill whitish; feet brownish. Male wing 303 mm, tail 135 mm, culmen 40 mm, tarsus 70 mm. Female wing 333 mm.

RANGE Tasmania, Australia and south New Guinea (between Merauke and Fly River).

SUBSPECIES IN NEW GUINEA A doubtfully distinct one, *galei* (Mathews).

NESTING [In a hole in a tree; eggs two, round, white; size 46 × 36 mm. Australian data.]

REMARKS The only masked owl we saw was sitting in a savannah tree in the daytime. Two stomachs examined contained mammals, rodents and a marsupial.

***Tyto tenebricosa* (Gould)**

Sooty Owl. Length 13–15 in. Adults: underparts sooty black variegated with small white spots and fine irregular bars; facial disk greyish white, blacker about eye, paler and more silvery white towards margin, which is edged on the sides and below with a black line; upperparts brownish

black with small white spots on crown, back, scapulars and wing-coverts; wing quills above lightly freckled on outer web; on underside with pale mottlings on inner webs of inner quills; tail blackish lightly vermiculated with whitish above or faintly barred; nearly uniform or lightly barred below; iris brown; bill brown; feet dusky. Male wing 255 (254–60) mm, tail 105 mm, culmen 40 mm, tarsus 68 mm. Female wing 385 (271–305) mm. There is considerable variation in the amount of white spotting and mottling.

RANGE Australia and New Guinea and Jobi Island from sea level to 7,000 ft, probably 12,000 ft, and perhaps higher.

SUBSPECIES IN NEW GUINEA One, *arfaki* (Schlegel).

NESTING [In a hole in a tree; eggs three, white, round; size 45·5 × 40·5 mm. Australian data.]

REMARKS Presumably this is usually a forest bird, and barn owl-like screeches heard at night from a forest camp may have been given by this bird. At 9,000 ft in the forest of the Snow Mountains cavities under the roots were apparently used as resting places, judging by the shed feathers and the many old pellets containing mammal bones found there. Higher up above the timber line on a grass and brush ridge at 12,000 ft where great boulders were scattered about, an owl, presumably of this species, apparently lived in the crevices under the rocks. We deduced this from shed feathers and an abundance of pellets consisting almost entirely of mammal remains, mostly from rodents of several species. A single owl, flushed from among these rocks, flew far and disappeared.

The feathers and feet of this owl are frequently used for neck ornaments and for decorating the string bags of some of the mountain Papuans.

### *Tyto capensis* (Smith)

also known as *Tyto longimembris*

Grass Owl. Length 12–14 in. Adults: underparts white (sometimes tinged buff?) with a few small black spots on underside of body, more distinct spots in under wing-coverts and some black tips to those of primaries, wing quills with a few distinct dark bars distally and with blackish tips, and two or three broken dark bars in tail; facial disk white with a little dark brown about eye, most extensive in front of eye, and with a well-defined narrow brownish edging below and on the sides; upperparts: crown, back and scapulars nearly uniform dull blackish except for some buffy from the bases of the feathers showing and many of the feathers with a single small to very small spot of white near the tip; lesser upper wing-coverts rich ochraceous or buffy, well

spotted with black; rest of upper wing-coverts mostly blackish with a few white flecks and some buffy; wing quills above blackish with some barring and freckling of blackish and tawny except towards tip; tail, central quills buffy white with two narrow bars and a broad subterminal bar, and some freckling; outer quills white with some irregular barring; iris brown; bill light brown; feet dusky. Male wing 350 mm, tail 120 mm, culmen 38 mm, tarsus 90 mm.

RANGE Africa, southern Asia to Fiji, New Guinea and Australia.

SUBSPECIES IN NEW GUINEA Two:

a) *papuensis* (Hartert); known from only a few scattered localities in mid-mountain grasslands of south-eastern Huon Peninsula and Central Highlands, 5,000 to 8,200 ft.
b) subspecies?; Balim Valley and Snow Mountains.

NESTING [On the ground under a tuft of grass; eggs round, white; size 44 × 31·5 mm. Australian data.]

REMARKS This long-legged owl elsewhere seems to be a shy, seldom-seen bird of open country covered with tall grass.

## Family Strigidae *Owls*

*(123 species, six in New Guinea)*

A family of nearly world-wide distribution with about 123 species of which six occur in the New Guinea area. The most obvious external character is the round shape of the facial disk, compared with the heart-shaped facial disk of Tytonidae.

### *Otus beccarii* (Salvadori)

Papuan Scops Owl. Length 10 in. The only Papuan owl with 'ear tufts'; tarsus feathered nearly to toes. Adult male: upperparts rufous heavily but narrowly marked with wavy bars of blackish brown; forecrown with a few ill-defined dark streaks and white flecks; ear tufts like back but with narrow, buffy white bars; scapulars with white on outer web, a subterminal bar which is rufous proximally and black distally, and a black tip; facial disk mixed brown and black, the posterior edge speckled with white; base of lores white extending into a short white eyebrow stripe; underparts rufous barred with white, the bars bordered with blackish brown and the edges of feathers of flanks and abdomen speckled rufous, blackish brown, and white; under tail-coverts white at base, then barred with rufous edged with black posteriorly; wing quills fuscous with interrupted bars of rufous and outer web notched with white; tail quills dark brown and rufous, the outermost notched with

white. Female: similar but much browner, the hind neck barred with white (Mayr and de Schauensee). Iris yellow; bill dusky streaked yellow; toes dusky yellow. Wing 171 mm, tail 79–83 mm, bill 32 mm, tarsus 32–35 mm.

RANGE Biak Islands only.

REMARKS This is the south-easterly limit of the range of the 'eared' *Otus* owls. A pair of them were frightened from the shade of a heavy, vine-covered tree in dense forest. They had eaten insects (Ripley).

### *Ninox theomacha* (Bonaparte)

Brown Owl. Length 10–11 in. Adults: upperparts dark chocolate-brown, with or without white spots in scapulars; wing and tail quills seen from above without bars, or with faint bars indicated; side of head blackish brown to dark greyish brownish with a little white about base of bill; throat and upper breast dark to medium chestnut-brown nearly or quite uniform; rest of underparts varies with subspecies, either dark chestnut feathers of abdomen edged with buffy or medium chestnut of breast and abdomen with white mottling and spotting; under wing with a few pale or whitish bars; underside of tail uniform fuscous; iris yellow; bill black, white or yellow at tip or mostly yellow; cere grey; feet yellowish, nails black. Wing 186 (176–227) mm, tail 93 mm, culmen 24 mm, tarsus 32 mm.

RANGE New Guinea and some western and some eastern islands; lowlands up to 6,600 ft.

SUBSPECIES Four:

a) *hoedtii* (Schlegel); Misol and Waigiu Islands; like *theomacha* but duller and sides of head brown (not sooty).
b) *theomacha* (Bonaparte); New Guinea; throat and breast uniform chocolate-chestnut; abdomen similar but feathers edged with buffy; size smaller, wing 176–86 mm.
c) *goldii* (Gurney); D'Entrecasteaux Archipelago; like *theomacha* but larger and with lower breast and abdomen with white edgings and spots; wing 215–27 mm.
d) *rosseliana* (Tristam); Rossel Islands, Louisiade Archipelago; like *goldii* but with white markings of underparts larger.

REMARKS This is a forest bird whose food seems to be insects. Its call has been recorded by Claude Grant as a weird, two-syllabled 'yow-yow'. We have called this owl the brown owl because of the nearly uniform brown colour of many individuals.

### *Ninox novaeseelandiae* (Gmelin)

Boobook Owl. Length 10–11 in. Adults: upperparts rusty or reddish

brown with semi-concealed white spots in scapulars and wing-coverts; forehead white; face brownish with some white at base of bill; underparts whitish plentifully mottled with red-brown on throat and breast and streaked and spotted with red-brown on abdomen; tail nearly uniform brown above, obscurely barred below; wing quills obscurely to plainly barred on outer web, conspicuously barred on inner webs; iris yellow; bill black, grey at base; cere olive-grey; feet yellow; nails black. Wing 205 (197–205) mm, culmen 25 mm, tarsus 35 mm.

RANGE New Zealand, Australia to Lesser Sunda Islands and south New Guinea (Oriomo and Wassi Kussa Rivers, west of Fly River).

SUBSPECIES IN NEW GUINEA One, *pusilla* (Mayr and Rand); as described.

NESTING [Nest in a hollow tree with two or three round, white eggs. Australian data.]

REMARKS This little owl was not an uncommon bird in the savannah country of south New Guinea. The birds spent the day presumably sleeping in small parties of two to four roosting well up in trees. The owls were alert and shy and usually flew when an intruder was still forty or more yards away and made off in various directions, sometimes flying a hundred yards before alighting in another tree. If it was not for the persistent mobbing of these startled birds by the leatherhead honeyeaters (*Philemon*), they would often have escaped notice. Despite this antipathy shown by the leatherheads, the food of these birds was entirely insects, judging by four stomach examinations. In Australia the call of this owl is given as 'more pork', and its species name 'Boobook' is from an Australian aboriginal rendering of the same call.

***Ninox connivens* (Latham)**

Barking or Winking Owl. Length 13–14 in. Adults: upperparts dark brown with a greyish cast; forehead narrowly white; scapulars and upper wing-coverts with semi-concealed white spots; side of head dark greyish brown with some white above and below eye and at base of bill; underparts white with plentiful, broad streaks of dull brown to reddish brown from throat to abdomen; wing quills seen from above with or without obscure barring in outer webs and pale to whitish edgings; inner webs with some distinct pale bars; tail with obscure, alternate pale and dark bars; iris yellow; bill black with cere and base olive-yellow; feet yellow. Wing 255 mm, tail 143 mm, culmen 30 mm, tarsus 36 mm.

RANGE Moluccas, Australia and eastern New Guinea (west on the south coast to Merauke, on the north coast to the Sepik River, also Karkar and Manam Islands); lowlands.

SUBSPECIES IN NEW GUINEA One, *assimilis* (Salvadori and D'Albertis); as described.

NESTING [In a hole in a tree, laying two to three round white eggs; size 41 × 32 mm. Australian data.]

REMARKS We found this owl in the forest about Lake Daviumbu, and again in the groves and plantations around the town of Daru. In south New Guinea we did not find it out in the open savannah where the boobook owl was fairly common. In the middle Sepik area it was the most common owl in gardens and by the river edge. In Australia this barking owl is said to have a double-note call resembling the barking of a dog, as well as a 'loud, blood-curdling shriek'. In New Guinea the food of this species is insects (seven stomachs examined).

### *Ninox rufa* (Gould)

Barred Papuan Owl or Rufous Owl. Length 16–20 in. Adults: upperparts blackish brown with many fine pale bars; underparts finely barred with white and brown, the barring forming narrow traverse bands; forehead white, side of head black; tail above with about eight broad dark and eight narrow pale bars; wing quills distinctly barred; iris yellow; bill horn-coloured; feet yellowish; claws black. Wing 330 (270–337) mm, tail 210 (170–214) mm, culmen 38 mm, tarsus 50 mm. Size varies with the subspecies.

RANGE Northern Australia, Aru Islands, New Guinea, and Waigeu Island; lowlands up to 6,000 ft.

SUBSPECIES IN NEW GUINEA Two:

a) *humeralis* (Bonaparte); New Guinea and Waigeu Island; male wing 326–37 mm, female wing 306–14 mm.
b) *aruensis* (Schlegel); Aru Islands; like *humeralis* but smaller, wing 270 mm.

NESTING [In a hole in a tree, two to three white, roundish eggs; size 53 × 45 mm. Australian data.]

REMARKS Presumably this is a forest owl.

### *Uroglaux dimorpha* (Salvadori)

Papuan Hawk Owl. Length 12–13 in. Adults: some white in forehead; crown and hind neck streaked blackish and buffy brown to rusty brown; rest of upperparts with transverse bands of blackish and pale brown or rusty brown; wing and tail conspicuously barred; underparts buffy or ochraceous white with sharply defined, narrow blackish streaking from throat to abdomen; iris yellow; bill bluish olive with tip darker; feet yellow. Wing 225 mm, tail 145 mm, culmen 30 mm, tarsus 32 mm.

RANGE Japen Island and New Guinea; lowlands up to 4,000 ft.

REMARKS This species seems to be very rare. Presumably it is a forest bird. The rather small head and relatively long tail gives specimens of this species a rather hawk-like appearance. The recorded contents of two stomachs included insects and a rodent. The specific name *dimorpha* refers to the different patterns of barred back and streaked underparts.

# Order 15 Caprimulgiformes

## Nightjars, Frogmouths, etc.

*Five families, three in New Guinea*

### Synopsis of Families

1 PODARGIDAE Frogmouths; two species in New Guinea; length 13–21 in.; horny part of beak wide, strong and conspicuous; figure 35.
2 AEGOTHELIDAE Owlet-nightjars; five species in New Guinea; length 7–10 in.; horny part of beak narrow, weak and inconspicuous; folded wing not reaching beyond middle of tail; figure 36.
3 CAPRIMULGIDAE Nightjars; six species in New Guinea; length 10–13 in.; horny part of bill narrow, weak and inconspicuous; folded wing reaching to near tip of tail; figure 37.

### Family Podargidae *Frogmouths*

*(Twelve species, two in New Guinea)*
This is a small family of night birds found in the Indo-Australian area with some twelve species, two of which occur in New Guinea.

The New Guinea-Australian species sit upright on perches in trees where they may spend the day sleeping with bill pointed skyward, their pattern, colour and shape camouflaging them by simulating a broken-off tree branch. In the dark they may give a variety of calls, and when feeding seem to take much of their food from the ground. The New Guinea species seem to prefer large insects, but any small animal of suitable size may be snapped up and mice, birds, lizards and frogs have been recorded in their stomachs. The nest is a scant platform of sticks in a tree, one white egg is laid, incubated by both parents, and the helpless young, clad in white down, is cared for in the nest.

#### Key to *Podargidae* Species

Size large, 18 in. or more; wing 264–324 mm: *Podargus papuensis.*
Size smaller, less than 17 in.; wing 181–243 mm: *P. ocellatus.*

***Podargus papuensis* (Quoy and Gaimard)**

Great Papuan Frogmouth. Length 18–21 in. Adult male: generally brownish grey to greyish brown or buffy grey birds with complicated, intricate patterns of brown, grey, black and white, patterns that vary from fine to coarse and of which an area of pale buff or grey in scapulars and an area of black blotches on each side of the breast are the most constant and conspicuous; iris red; bill horn; feet olive; wing 310 (264–324) mm, tail 280 mm (central quill) and 180 mm (outer quill), culmen 50 mm, width of gape 75 mm, tarsus 28 mm. Female: on average slightly smaller than male and is more often in a brown phase plumage. Young: iris yellow and much white in plumage.

RANGE New Guinea and some satellite islands (Misol, Salawati, Batanta, Waigeu, Japen, Biak, Numfur and Aru Islands) and northern Queensland; in New Guinea from lowlands up to 5,000 ft.

SUBSPECIES Several have been described and it is true that there is much geographical variation in size, but populations of large, medium and small sized birds, geographically arranged, form a chequerboard pattern which makes recognition of subspecies impractical.

NESTING A small, substantial platform of sticks in a fork of a tree. [One egg, white; size 49 × 34 mm. Australian data.]

REMARKS This big frogmouth was a fairly common bird in both rain forest and the denser savannah, but we saw it more frequently in the savannah, perhaps because conditions for observation are better there. During the day the birds, singly, in pairs or occasionally three together, sit on large branches sleeping. The upright, bill-pointed-heavenward posture is only one of the poses adopted. Often these sleeping birds allow a close approach, but once alarmed and startled into flight they fly strongly to some distance and do not permit a second close approach. At night their eyes glow feebly in the rays of a torch. The common call heard at night is a low, deep 'uum uum' that may be the weird or mournful call sometimes recorded. Once a bird perched upright on a branch near the end of my tent and gave a quite different call, a low, deep muffled series of notes rapidly repeated, recalling a *Centropus* call, and ending with a click; I wrote it 'bu-bu-bu-bu-bu click'. Presumably, like its Australian relatives, this species uses its large bill to take prey from the ground, though probably it may do the same from a branch. Of some twenty-three stomach examinations, all had eaten large insects including locusts, beetles and caterpillars, and one in addition had eaten a small bird and another a small lizard, while a mouse has been recorded in the food of another individual.

***Podargus ocellatus* (Quoy and Gaimard)**

Little Papuan Frogmouth. Length 13–15 in. (island subspecies larger). Adult plumage: pattern variable in detail and density and occurs in a grey-brown and a red-brown phase, the latter usually females. Plumage somewhat like that of great papuan frogmouth but size much smaller and sometimes much less patterned; iris red or brown; bill horn-colour; feet yellowish olive. Wing 187 (to 243) mm, tail 150 mm, culmen 33 mm, width of gape 55 mm, tarsus 18 mm.

RANGE New Guinea and many satellite islands, north Queensland and Solomon Islands; in New Guinea from sea level to 5,000 ft.

SUBSPECIES IN NEW GUINEA Three:

a) *ocellatus* (Quoy and Gaimard); western Papuan Islands (Waigeu, Salawati, Misol), islands in Geelvink Bay (Japen, Meos Num), Aru Islands and New Guinea; wing 181–93 mm; females usually rufous.
b) *intermedius* (Hartert); Fergusson, Normanby and Goodenough Islands and Trobriand Islands; wing 211–43 mm; like *ocellatus* but larger; males greyish with reduced pattern; females rufous with strong pattern.
c) *meeki* (Hartert); Tagula (Sudest) Island, Louisiade Group; intermediate in size between *ocellatus* and *intermedius*; wing 190–5 mm, tail 167–80 mm; sexes less different than in *ocellatus* and *intermedius*; female not more rufous than male, and darker, more blotched with blackish brown.

NESTING Nest a tiny thin structure of twigs and bits of vine, resting on a branch. A single egg, white; size 40 × 28·5 mm; both sexes incubate; young covered with white down.

REMARKS This species is much less common than the great papuan frogmouth. In addition to a usual food of insects, one was reported to have eaten a frog.

## Family Aegothelidae *Owlet-nightjars*

*(Seven species, five in New Guinea)*

This family of night birds which share the appearance of nightjars and frogmouths has its headquarters in New Guinea where five of the seven known species live, one of them ranging to Australia. Of the two other species, one lives in the Moluccas and the other in New Caledonia. The taxonomy of the group is difficult, specimens of some species are rare, and species lists in some cases are tentative.

The common name for these birds in most general bird books is

'owlet-frogmouth', but Australian usage tends to favour 'owlet-nightjar' which is used here.

As these are nocturnal, secretive birds with soft brown-grey coloration, there are few notes on their habits in New Guinea beyond the conclusion that they are tree birds that feed chiefly on insects. The Australian species hawks for insects or takes them from the ground, spends the day in hollow trees (some New Guinea species probably sleep perched amid dense vegetation), and utters whistling calls and churring notes. It nests in a hollow tree or in a hole in a bank, laying three to five white eggs. The young are down-covered at first, cared for in the nest by the parents, and the first plumage is similar to that of the adult.

### Notes on Identification

The variability in size, colour and pattern of some species, the amount of difference between some subspecies within a species which appears greater than that between some species, and the change in altitude preference of some subspecies, have added to the difficulties of grouping the subspecies into species, and also in providing keys to identification. Some species are rare in collections and presumably so in actuality. The present arrangement is tentative. As there are colour phases known in some species the following diagnoses are based largely on pattern, and a synopsis rather than a key seems preferable.

### Diagnosis of *Aegotheles* Species

a) CRISTATUS Length 9 in.; pale collar on hind neck present; even transverse pattern of barring on back and breast; crown with black blotches; no white spots on upperparts; ear-coverts more or less rufous; pale markings on outer webs of primaries in form of distinct bars.

b) BENNETTII Length 8–9 in.; very like *cristatus* but with barring finer, appearance more blackish; ear-coverts greyish black and pale markings on outer webs of wing quills not forming bars or distinct notches. Where *cristatus* and *bennettii* occur together in south New Guinea, *bennettii* is smaller.

c) WALLACII Length 8–9 in.; no pale collar on hind neck; upperparts finely vermiculated in a transverse pattern; a few white spots, round or triangular, in scapulars or back; underparts with some fine barring on sides of throat and breast but with considerable dark spotting and blotching on breast and abdomen.

d) ALBERTISII Length 7–8 in.; pale collar on hind neck present; upperparts with few to many white spots; underparts with much dark blotching and spotting, and little to no barring.

e) INSIGNIS Length 10–11 in.; no pale hind collar; the large size and

the conspicuous patch of large white spots edged with black on each side of the body characterize this variable species. In addition, the general bright chestnut colour of many specimens is distinctive.

***Aegotheles cristatus* (White)**

Australian Owlet-nightjar. Length 9 in. Adults: very like *A. bennettii* but side of face more or less rufous; pale barring on upperparts coarser; barring on breast coarser and less extensive; abdomen with more uniform white; and barring or notching on outer webs of primaries coarser and more definite; plumage usually grey, sometimes a rufous phase; iris brown; bill black; feet flesh. Wing 138 (130–49) mm, tail 117 mm, culmen 19 mm, tarsus 24 (20–24) mm.

RANGE Tasmania, Australia, and southern and western New Guinea; lowlands to 3,200 ft.

SUBSPECIES Two:

a) *affinis* (Salvadori); Arfak Peninsula up to 3,000 ft; breast usually completely and evenly barred; wing 130–9 mm.
b) *major* (Mayr and Rand); south New Guinea between Oriomo River and Tarara; like *affinis* but barring of breast reduced; wing 138–49 mm.

NESTING [In a shallow hole in a tree; three or four white eggs. Australian data.]

REMARKS The species *cristatus* and *bennettii* both occur on the Oriomo River in south New Guinea where they are easily separated on both size and plumage; *affinis* has usually been considered conspecific with *bennettii* but is more similar to the south New Guinea race of *cristatus*.

The specimens of *cristatus* found in south New Guinea were in shrubby trees in the savannah.

***Aegotheles bennettii* (Salvadori)**

Barred Owlet-nightjar. Length 8–9 in. Adults: upperparts, top of head black, a few feathers barred with grey; a distinct white collar on hind neck; rest of upperparts dusky black, finely barred or vermiculated or freckled with whitish giving a regular transverse pattern; wing quills fuscous with some pale markings in outer web more or less forming bars or notches; tail fuscous with ten to twelve narrow, freckled bars; underparts whitish finely barred, vermiculated and freckled with fuscous to give a transverse pattern, densest on breast, least on abdomen which is nearly white; iris brown; bill dark brown; feet flesh-colour. Some specimens have head and breast strongly tinged rusty. Wing 127 mm (121–42 mm, varies with subspecies), tail 110 mm, culmen 20 mm, tarsus 20 mm.



3 *Campochaera sloetii*, Orange Cuckoo-shrike (top left); *Todopsis cyanocephala*, Blue Wren Warbler (top right); *Myzomela rosenbergii*, Black and Red Honeyeater (second row left); *Paramythia montium*, Crested Berrypecker (second row right); *Ifrita kowaldi*, Blue-capped Babbler (third row left); *Oreocharis arfaki*, Tit-berrypecker (third row right); *Eupetes leucostictus mayri*, High Mountain Eupetes (bottom left); *Melithreptus albogularis*, White-naped Honeyeater (bottom right).

RANGE Eastern and central New Guinea lowlands up to 2,000 ft, west in the south to Oriomo River, in the north to Mamberamo River; also D'Entrecasteaux Archipelago.

SUBSPECIES Three:

a) *bennettii* (Salvadori and D'Albertis); south coast of south-eastern New Guinea west to Oriomo River; size smaller, wing 121–8 mm.
b) *wiedenfeldi* (Laubmann); north New Guinea from Idenburg River to Holnicote Bay; like *bennettii* but larger, wing 126–42 mm.
c) *plumiferus* (Ramsay); D'Entrecasteaux Archipelago (Fergusson and Goodenough Islands); like *bennettii* but with barring reduced on breast and plumage more buffy tinged.

### *Aegotheles wallacii* (Gray)

Wallace's Owlet-nightjar. Length 8–9 in. Adults: upperparts mostly greyish black finely freckled and vermiculated with whitish, sometimes with a few buffy or white spots in lower back scapulars and wing-coverts and some obscure rusty brown markings on crown; wing quills fuscous with outer webs marked with pale bars or notches; tail fuscous with ten to twelve narrow, freckled pale bars; side of head blackish feathers obscurely barred with grey or rusty; underparts: chin buffy; throat and breast barred and blotched black, rusty and white, the barring being especially evident on the sides of the throat; abdomen buffy or rusty white, spotted, blotched and with some irregular black bars; iris brown; bill brownish black; feet black. Wing 120 (113–33) mm, tail 115 mm, culmen 17 mm, tarsus 15 mm.

RANGE Vogelkop, south-western New Guinea and Aru Islands; usually lowlands, one population at 5,000 ft in Weyland Mountains.

SUBSPECIES Two:

a) *wallacii* (Gray); Aru Islands and lowlands of New Guinea in Vogelkop and in south New Guinea east to upper Fly River; size small, male wing 117–23 mm, female wing 113–26 mm.
b) *gigas* (Rothschild); Weyland Mountains; like *wallacii* but occasionally with trace of a collar on hind neck, and larger, male wing 129–33 mm, female wing 132–9 mm.

REMARKS This species is especially interesting in being a lowland bird having a single, large population in a small mountain area.

### *Aegotheles albertisii* (Sclater)

Mountain Owlet-nightjar. Length 7–8 in. Adults: upperparts variable, from greyish brown to rufous brown mottled, spotted and vermiculated in varying amounts with black and white, and with a white to buffy collar on hind neck; wing quills fuscous with distinct pale bars or

notches on outer webs; tail quills fuscous with ten to fourteen reddish brown to grey bars; more or less black around eye; rest of side of head more or less finely barred or mottled black and whitish or black and rufous; underparts, with an intricate pattern, chiefly of spots and blotches of black, white and grey, sometimes with much rufous on breast, the pattern becoming less plentiful on abdomen which is mostly whitish in some specimens; iris brown; bill blackish brown; feet flesh-colour. Male wing 122 mm (115–37 mm, varying with subspecies), tail 100 mm, culmen 16 mm, tarsus 16 mm.

RANGE Mountains of New Guinea, from 3,000 to 12,000 ft.

SUBSPECIES Four:

a) *salvadorii* (Hartert); south-eastern New Guinea to Central Highlands, Snow Mountains (except range of *archboldi*) and Weyland Mountains; a rather dull form with general pattern rather fine; male wing 117–27 mm, female wing 119–23 mm.
b) *archboldi* (Rand); Victor Emanuel Mountains, north slope of Mt Wilhelmina in Snow Mountains, and part of Weyland Mountains; like *salvadorii* but general colour richer and pattern coarser; perha a separate species.
c) *albertisii* (Sclater); Arfak Mountains, Vogelkop; intermediate between *salvadorii* and *archboldi*.
d) *wondiwoi* (Mayr and Rand); Mt Wondiwoi, Wandammen Peninsula; like *albertisii* but larger, wing 137 mm.

REMARKS This owlet-frogmouth was evidently fairly common in the higher mountain forests, judging by the numbers seen of such a silent, secretive night bird. The birds were usually disturbed from their resting places in dark tangles of shrubbery and bamboo in the lower part of the forest, and were not seen until they flew. After a short flight they perched low, in an owl-like attitude sitting up straight with widely opened eyes. One bird, however, was found in the alpine tree-fern country of the Wharton Range. It was flushed from the hollow end of a broken off tree-fern, the sort of place in which one would expect to find it nesting, and flew into the adjacent forest. Seven stomachs examined contained insects.

### *Aegotheles insignis* (Salvadori)

Large Owlet-nightjar. Length 10–12 in. Adult plumage: variable, a bright chestnut and a deep red-brown general coloration are known. A bright chestnut bird has small white dots surrounded with black on crown and back, and larger white in scapulars and on wing-coverts; some white in lores and extending to eyes; wing quills with faint dark and light bars; chestnut tail with about ten to twelve pale, partly dark

edged, widely spaced bars; chestnut underparts with conspicuous white, partly black edged spots forming a patch on each side of body, and with some similar but smaller markings on throat. Some young birds are less heavily marked, being nearly uniform above. A dark red-brown plumaged bird has similar white marking above but there is some dark barring; the red-brown tail has about twelve narrow black bars; the black and white markings below are more extensive and plentiful and there is some dark barring on the abdomen. Iris brown; bill brown colour; feet pinkish dusky. Wing 172 mm (138–77 mm in subspecies), tail 135 mm, culmen 20 mm, tarsus 22 mm.

RANGE Mountains from Arfak to south-eastern New Guinea; 6,000 to 9,000 ft, occasionally to sea level.

SUBSPECIES Two:

a) *insignis* (Salvadori); (*pulcher* is considered a synonym); the range of the species except that of *tatei*; wing 167–77 mm.
b) *tatei* (Rand); headwaters Fly River near sea level; like *insignis* but smaller, wing 138–45 mm.

NESTING An adult was observed in the Hindenburg Mountains in a tree cavity fifteen feet up in steep hill forest. It peered out with eyes wide open at 3.30 p.m. Presumably this was a nesting site.

REMARKS This is a fairly common but secretive species of the forest edge and open forests. A specimen observed by day in riverine forest bordering the Wahgi River and adjacent grasslands resembled a cluster of dead leaves as it sat still, eyes closed, for many minutes. Its breast and tail feathers were heavily worn as if by nest abrasion.




## Family Caprimulgidae *Nightjars*

*(Sixty-seven species, six in New Guinea)*

This family of some sixty-seven species has a wide distribution in the warmer parts of the world with the more southern and northern species moving into more tropical areas in their respective winters. Some are forest birds, some live in open country, and they are usually found alone or in pairs.

Though some nightjars may fly by day, more typically these birds rest by day and are active at night, either flying about catching insect food on the wing or watching for it from a perch and flying out to catch it. Some species sleep on the ground, some commonly do so on larger branches when they often perch length-wise on the branch, their small feet being little adapted for grasping a twig. As they have very short

legs, nightjars rest with the abdomen on the ground, and their variegated plumage of browns, blacks, buffs and greys provides them with good camouflage in which the birds have such confidence that at times one can almost step on them before they fly.

The voices of nightjars, sometimes uttered on the wing, sometimes by a bird at rest, are often loud with repeated phrases and are very conspicuous at night. Both parents share the care of eggs and young. The eggs, often heavily patterned, are laid directly on the ground with no nest being made. The young are down-covered and can soon toddle short distances but they are cared for at or near the nest place until full grown.

Six species are known from New Guinea, three as residents, two as non-breeding visitors from the south, and one as a non-breeding visitor from the north.

### Synopsis of Genera

CAPRIMULGUS Two species in New Guinea; length 10–11 in.; with conspicuous rictal bristles.

EUROSTOPODUS Four species in New Guinea; length 10–13 in.; rictal bristles absent or small and obscure.

### Key to *Caprimulgidae* Species

1 (a) Outer tail feathers with broad white tip: *Caprimulgus macrurus.*
(b) Outer tail feathers with narrow white subterminal band: *C. indicus* (male).
(c) Not as above: 2.

2 With white spots near centre of wing quills: 3.
No white spots in wing quills: 4.

3 Abdomen and under tail-coverts barred: *Eurostopodus albogularis.*
Centre of abdomen and under tail-coverts plain buffy: *E. guttatus.*

4 With buffy spots near centre of outer primaries: *Caprimulgus indicus.*
Wing quills uniform blackish: 5.

5 Lowlands: *Eurostopodus papuensis.*
Mountains, 7,500 to 10,000 ft: *E. archboldi.*

### *Caprimulgus macrurus* (Horsfield)

Large-tailed Nightjar. Length 10–11 in. Adults: upperparts pale brownish grey vermiculated with black and with black streaks in crown, an indication of a buffy hind collar, and back and scapulars and upper wing-coverts with patches of black and buffy; wing quills black, barred basally with rufous and with four outer primaries with a white spot near middle of quill forming a distinct bar in the spread wing; central tail feathers grey freckled with black and with obscure black bars and outer quills black with outer web sparingly marked rufous and terminal third

or quarter white; underparts: throat and breast brownish grey vermiculated with blackish and with a white bar across throat, abdomen, flanks and under tail-coverts buffy barred with dark brown; iris brown; bill dark brown or black; feet dusky. Wing 180 (178–88) mm, tail 135 mm, culmen 11 mm, tarsus 16 mm. Female has rather less white in the tail than the male.

RANGE Southern Asia through the Malay Archipelago to New Guinea, New Britain and north Australia area; in New Guinea usually in the lowlands, but occasionally in the mid-mountain grassy bushlands.

SUBSPECIES IN NEW GUINEA Three recognized:

a) *schillmolleri* (Stresemann); northern Moluccas and western Papuan Islands (Waigeu and Batanta); like *yorki* but darker.
b) *yorki* (Mathews); northern Australia, Aru Islands, New Guinea, Fergusson Island, Japen, Biak, Manam, Karkar, Long and Rook Islands and New Britain (as described).
c) *meeki* (Rothschild and Hartert); Tagula (Sudest), Louisiade Archipelago; like *yorki* but darker.

NESTING The eggs are laid on a leaf litter on the ground. Eggs two, pale brownish pink, heavily marked with earth brown and secondary grey over whole shell; size 30 × 21 mm.

REMARKS The large-tailed nightjar is a bird of the forest edge and shrubbery whether it be along river edges, the edges of clearings or grasslands, and in forest interrupted by bamboo thickets or patches of savannahs.

Sometimes the species is very common and the calls are conspicuous: a single note, a clear 'cup' repeated over and over again, from which the bird is called a coffin bird locally among the Australian residents, from a fancied resemblance of the sound to that of a hammer driving nails into a coffin.

### *Caprimulgus indicus* (Latham)

Japanese or Jungle Nightjar. Length 10–11 in. Adults: similar to *C. macrurus* but with less brown and buff in body plumage; rufous barring in wing quills more plentiful and more pronounced, and tail most different, lacking the white tips to the outer quills and being barred throughout with, in the male, a narrow white subterminal band; iris brown; bill black; feet dusky. Wing 210 mm, tail 120 mm, culmen 17 mm, tarsus 15 mm.

RANGE Himalayas to eastern Siberia, south Ceylon, Malay Peninsula and parts of Japan; winters southward to the Greater Sunda Islands; rarely farther south and east. A single New Guinea record.

SUBSPECIES IN NEW GUINEA One, *jotaka* (Temminck and Schlegel); the breeding bird of Japan and north-eastern Asia.

REMARKS The New Guinea record was obtained near Manokwari.

***Eurostopodus albogularis* (Vigors and Horsfield)**
also known as *Eurostopodus mystacalis*

White-throated Nightjar. Length 13 in. Adults: above dark grey with black vermiculation and spots and streaks and some rufous markings; in more detail: top of head grey with fine black vermiculation and in the middle with black streaks; upper back similar but markings coarser, some rufous in hind neck; scapulars and upper wing-coverts paler grey with black and pale rufous spots and black vermiculation; wing quills blackish sparsely spotted with rufous and with white spots on several outer primaries near centre; tail grey with black bars and vermiculation; underparts: throat blackish with buffy spots and with a white bar across it, broken in middle; breast black marbled with grey, abdomen, sides of body, under tail-coverts, and under wing-coverts barred black and buffy ochraceous; iris brown; bill black; feet dusky. Wing 251 mm, tail 155 mm, culmen 27 mm, tarsus 22 mm.

RANGE Breeds in eastern Australia and in Solomon Islands; in non-breeding season some Australian birds migrate to eastern and central New Guinea (west in south to Fly River, in north to Idenburg River); lowlands to 5,000 ft.

SUBSPECIES IN NEW GUINEA One, *albogularis* (Vigors and Horsfield); of eastern Australia.

REMARKS This nightjar seems rare in New Guinea. Our only experience with it was in August and September on the middle Fly River when we saw about five solitary individuals, flushing them from the ground on the edge of the forest adjoining savannah, and in April on the Idenburg River when we saw one feeding over the brush and marsh of the lagoon near the forest. A live bird was brought to camp in the Wahgi Valley on 15 May.

***Eurostopodus guttatus* (Vigors and Horsfield)**

Spotted Nightjar. Length 12 in. Adults: upperparts predominately pale grey finely freckled with black, and with black and buff streaks in middle of crown and narrow streaks of black and buff especially in scapulars and foreback; some ochraceous in hind neck; wing quills black with rufous spots basally and white patches on four outer primaries near centre; central tail feathers grey finely patterned with black, outer tail feathers black barred grey and rufous; underparts: throat rufous and black with a white patch; breast barred buffy white and black;

abdomen buffy, flanks sparsely barred with black; under tail-coverts buffy with few or no dark markings; iris brown; bill dark brown; feet brownish. Wing 222 mm, tail 150 mm, culmen 22 mm, tarsus 18 mm.

RANGE Australia; some non-breeding birds migrate to Aru Islands (where also breeds?).

SUBSPECIES IN NEW GUINEA One, *guttatus* (Vigors and Horsfield); breeds in eastern Australia.

***Eurostopodus papuensis* (Schlegel)**

Papuan Nightjar. Length 10 in. A dark nightjar, brownish grey and black with some buffy markings. Adults: upperparts brownish grey freckled with black and with some small black blotches in crown, black blotches and buffy marks in foreback, scapulars and wing-coverts; wing quills uniform black sometimes with a few rufous spots proximally; central tail feathers obscurely freckled and mottled with grey-brown and black; outer tail feathers black with narrow, irregular rufous bars; throat mixed black and pale rufous with a white throat patch; upper breast feathers black barred with rufous; lower breast and abdomen black with many broad, buffy bars or spots; iris brown; bill black; feet dusky. Wing 200 mm, tail 137 mm, culmen 20 mm, tarsus 15 mm.

RANGE Salawati Island and New Guinea lowlands.

SUBSPECIES IN NEW GUINEA Two recognized:

a) *papuensis* (Schlegel); Salawati Island and Vogelkop of western New Guinea.
b) *astrolabae* (Ramsey); eastern New Guinea west to Mimika River on the south and Idenburg River in the north; like *papuensis* but less rufous(?).

NESTING On the bare ground from which loose leaves were scraped away in a small opening in the low dense slender undergrowth and bamboo of open forest on a ridge. A single egg, bluntly ovate, light brown heavily marked with intermingling blotches of brown of various shades to give a marbled effect; size 32 × 25 mm. The female was found incubating in the early morning, the male in the evening (one nest seen).

REMARKS Presumably this is a forest nightjar.

***Eurostopodus archboldi* (Mayr and Rand)**

Archbold's Nightjar. Length 10–11 in. A very dark, blackish bird. Adults: upperparts: crown black margined with freckled grey; back and wing-coverts black with streaks and blotches of grey and small distinct spots of rufous; wing quills black; central tail feathers barred

with black and mottled grey; outer tail feathers black with incomplete rufous bars; underparts black with broken patch of white on throat, white or ochraceous spotting or barring on breast; and larger white to ochraceous spots on abdomen; iris brown; bill black; feet pinkish dusky. Wing 210 mm, tail 145 mm, culmen 23 mm, tarsus 14 mm. Wear on the tips of the breast feathers may reduce or eliminate the pale subterminal bars.

RANGE New Guinea mountains (south-eastern New Guinea, Central Highlands, and Snow Mountains); from 7,500 to 10,000 ft.

REMARKS This bird apparently sleeps during the day perched on a low, moss covered branch in the cloud forest and perhaps on the ground or on a log in the mid-mountain taller forests. On Mt Tafa, a few birds appeared in a clearing in the forest at dark, flying about hawking for their insect food over the open area, over shrubbery, and amongst the top of the forest trees. Possibly the species is not as scarce as the few records imply.

# Order 16 Apodiformes

## Swifts and Crested Swifts

*Three families, two in New Guinea*

This order includes the flower-feeding hummingbirds of the Americas, as well as the aerial insect-feeding swifts; a widespread group in the warmer parts of the world. The tree or crested swifts of the Indo-Australian area are also included here.

### Synopsis of Families

1 APODIDAE Swifts; seven species in New Guinea; without conspicuous head markings; figure 38.
2 HEMIPROCNIDAE Crested or tree swifts; one species in New Guinea; with conspicuous white lines on head; figure 39.

### Family Hemiprocnidae *Crested Swifts*

*(Three species, one in New Guinea)*
This is a small, very distinct family of only three species, all in the same genus, that has a range from southern Asia to Java, New Guinea and Solomon Islands. The three species have similar habits. One species occurs in New Guinea and in colour, form and behaviour is quite distinctive.

***Hemiprocne mystacea* (Lesson)**
Moustached Swift. Length 11–12 in.; wings very long; tail very long and deeply forked. Adults: greyish and black with a conspicuous white line above and below eye, white inner secondaries, and white abdomen; in more detail: upperparts: crown black with a blue gloss, back dark blue-grey; wing black glossed blue with inner secondaries white; tail black glossed blue; side of head black with a white line of elongated

feathers from forehead over eye to nape, and another from chin over malar area with elongated tips of feathers reaching side of neck; a little chestnut in ear-coverts; underparts: chin narrowly white, throat very dark grey paling to grey on breast and pale grey on flanks; centre of abdomen and under tail-coverts white; undersurface of tail and wing black, the secondaries with a narrow white band near the tips; iris brown; bill black; feet dusky. Wing 228 (210–48) mm; tail, outer feathers 175 mm, central feathers 50 mm; culmen 16 mm, exposed culmen 8 mm; tarsus 9 mm. The nestling plumage has considerable pale rufous and white barring.

RANGE Moluccas to New Guinea, Bismarck Archipelago and Solomon Islands. In New Guinea from sea level to 4,000 ft.

SUBSPECIES IN NEW GUINEA Two:

a) *mystacea* (Lesson); western Papuan Islands (Misol, Batanta, Gebe, Waigeu), islands of Geelvink Bay (Japen, Numfor, Biak), and all New Guinea; wing 226–48 mm.
b) *confirmata* (Stresemann); Moluccas and Aru Islands; like *mystacea* but smaller, wing 210–31 mm; south New Guinea birds are somewhat intermediate.

NESTING [Probably as with the rest of the family, a tiny cup of vegetable matter and feathers glued together and on to a high exposed branch with saliva. A single egg, pale blue-grey; young downy and helpless, cared for in the nest by both parents. The nest is so small that one can see the incubating bird without realizing that it is sitting on a nest.]

REMARKS This is an elegant bird in both colour and shape, at rest and in flight. It sits quietly crossways on a commanding perch, such as a twig or branch above the forest, forest edge, or in some tree left standing in a clearing. Often the birds are seen in pairs or in small parties. Now and then they launch into flight and soar about, presumably catching their insect prey. Though the birds differ from the wood swallows in many ways, in habitat and habits they resemble them; an ecological duplication in two quite different families.

## Family Apodidae *Swifts*

*(Seventy-six species, seven in New Guinea)*

This family has a world-wide distribution in the warmer parts of the globe and contains some seventy-six species of which seven occur in New Guinea, five as residents and two as non-breeding visitors from Asia.

Swifts spend the whole day in flight, sometimes in flocks, catching

insects. Some species in flight are somewhat swallow-like, but with much longer, more stiffly held wings; while the spine-tailed swifts with their short tails and very long wings have a distinctive appearance and are among the fastest flying of birds. When these birds roost, they cling to the sides of hollows in trees or the walls of caves.

Swifts commonly nest, sometimes in colonies, either in hollow trees or in caves or crevices in rocks, and use much saliva in gluing the nest material together and the nest to its supporting wall or ledge. The edible-nest swiftlet of the orient (genus *Collocalia*) makes its nest entirely of saliva which hardens into a whitish solid (used as a basis for soup) but the New Guinea species of the genus use much vegetable matter in the nest. The eggs are white; the young hatch naked and are cared for in the nest by the parents.

### Synopsis of Genera

1 APUS One species; length 7 in.; tail deeply forked and soft at tip; plumage black with white throat and rump.

2 CHAETURA Two species; length $4\frac{1}{2}$–$7\frac{1}{2}$ in.; tail short, square and spine-tipped; plumage black and grey or black and brownish with white throat and under tail-coverts.

3 COLLOCALIA Four species; length $3\frac{1}{2}$–$5\frac{1}{2}$ in.; tail moderate, slightly forked, and soft tipped plumage blackish and greyish or blackish with white abdomen.

### Key to *Apodidae* Species

1 Rump white; tail deeply forked; length 7 in.: *Apus pacificus.*
Rump dark: 2.

2 Throat and under tail-coverts white; tail short, spine-tipped; length $7\frac{1}{2}$ in.: *Chaetura caudacuta.*
Throat not white: 3.

3 Throat dark grey; abdomen white; length $3\frac{1}{2}$ in.: *Collocalia esculenta.*
No white in plumage: 4.

4 Tail short, square, spine-tipped; length $4\frac{1}{2}$ in.: *Chaetura novaeguineae.*
Tail moderate, slightly forked; length 5–$5\frac{1}{2}$ in.: *Collocalia hirundinacea, C. vanikorensis,* and *C. whiteheadi.*

### *Apus pacificus* (Latham)

White-rumped Swift. Length 7 in.; tail deeply forked. Adults: upperparts generally blackish with a broad white bar on rump; chin and throat white with rest of underparts brown, each feather edged with white. Wing 180 mm; tail, outer quills 80 mm, central quills 50 mm.

RANGE Asia, migration in non-breeding season south to winter in the austral summer in the Australian area.

SUBSPECIES IN NEW GUINEA One, *pacificus* (Latham); breeding in eastern Asia.

REMARKS In south New Guinea in October and November we saw a few small parties of these birds feeding over the savannah or over the Fly River. Sometimes these birds associated with *Chaetura caudacuta.*

### *Chaetura caudacuta* (Latham)

Northern Spine-tailed Swift. Length 7½ in.; tail short and spine-tipped. Adult plumage: crown, wings and tail black glossed blue-green contrasting with the greyish brown back; forehead and throat white; rest of underparts brown except for sides of abdomen and under tail-coverts which are white; iris brown; bill black; feet dusky. Wing 202 mm, tail 55 mm, culmen 12 mm, tarsus 18 mm.

RANGE Breeds in Asia, winters south in the austral summer to Australia; in New Guinea lowlands up to 5,000 ft.

SUBSPECIES IN NEW GUINEA One, *caudacuta* (Latham); a migrant from eastern Asia.

REMARKS On the lower Fly River in October and November this species was found occasionally in small flocks, circling high and low, and feeding over the river, the forest, and the savannah. Sometimes it associated with numbers of *Apus pacificus.* The speed of these birds on the wing as they swooped downwards was impressive.

### *Chaetura novaeguineae* (d'Albertis and Salvadori)

New Guinea Spine-tailed Swift. Length 4½ in.; tail short and spine-tipped. Adult plumage: upperparts, including wings, black glossed with blue-green; throat and breast either grey or like back; abdomen paler grey. Wing 127 mm, tail 30 mm, bill 17 mm, tarsus 14 mm.

RANGE New Guinea, in lowlands.

SUBSPECIES Two:

a) *novaeguineae* (D'Albertis and Salvadori); south New Guinea (Mimika River to Port Moresby); throat grey.
b) *burgersi* (Reichenow); north New Guinea (Mamberamo to Sepik Rivers); like *novaeguineae* but with throat darker, more like back. [*mamberana* (Neumann) was described from the Mamberamo River, apparently intermediate between *novaeguineae* and *burgersi.*]

NESTING Probably in hollow trees.

REMARKS Usually this species was seen in small flocks feeding high over forests, native gardens, second-growth areas, or rivers, but sometimes the flock came down and fed low.

### Genus *Collocalia*

The little swiftlets of this genus range from southern Asia and Madagascar to northern Australia (Cape York) and the eastern Pacific islands. Some of the grey and blackish birds of this genus present some of the most puzzling problems in bird taxonomy. Not only are the specific limits very difficult to draw, but the relationships between some populations of separate island groups are only partly worked out, and the identification of certain specimens is unsatisfactory, and even the identification of some distinct species such as *C. hirundinacea* and *C. vanikorensis* needs careful comparison of specimens. The nomenclature here follows that of Mayr's 'Check list'. It is possible that a combination of field work and collecting will help clarify some of these problems. For an excellent survey of the biology of related species in Borneo, see Lord Medway (1962) *Ibis* 45–66.

### *Collocalia esculenta* (Linnaeus)

Glossy Swiftlet. Length 3½ in.; tail moderate in length, square or slightly forked, soft at tip. Adults: upperparts: crown, back to upper tail-coverts and wing-coverts black highly glossed bluish; wing and tail black lightly glossed blue; underparts: throat grey; breast grey some of feathers edged white; abdomen white. Size varies in a gradual manner with altitude; lowland birds measure wing 97–105 mm, birds from above 10,000 ft 108–20 mm. One lowland specimen measures wing 102 mm, tail 37 mm, culmen 7 mm, exposed culmen 3 mm, tarsus 7 mm.

RANGE Malaya and through the islands to the Solomon Islands, New Guinea and New Caledonia; in New Guinea from near sea level to 12,000 ft.

SUBSPECIES IN NEW GUINEA Two:

a) *esculenta* (Linnaeus); Moluccas through New Guinea lowlands and satellite islands.
b) *erwini* (Collins and Hartert); the name for the larger bird from higher altitudes.

NESTING A rather bulky structure of rootlets and lichen placed where there is at least dim light on a little sheltered rock face or against the wall of an overhanging cut bank along a stream, singly [or in loose colonies of three to six, possibly more in a cave?]; eggs two, blue-white to white.

REMARKS The glossy swiftlet is the smallest New Guinea swift and differs from its near relatives in its slower flight, in usually flying low with frequent changes of course, and often being in pairs or small parties which seem to have limited areas over which they range. Sometimes the birds hawk for their insect food by flying low over open country, among

the tops of trees, along forest trails and streams, and even into the edge of the forest.

Though the species occurs down to near sea level it seemed absent from the extensive flat country of the Fly and Idenburg Rivers, perhaps because the birds do not travel far from hilly country in which they find suitable nesting (and roosting?) places.

***Collocalia hirundinacea* (Stresemann)**

Mountain Swiftlet. Length 5 in.; tail slightly forked; tarsus feathered. Adults: upperparts black, underparts silvery grey; much concealed white in bases of feathers of upperparts; bill very small; iris brown; bill black; feet dusky. Size varies with altitude in a clinal manner in Snow Mountains: 6,000 ft altitude, bird's wing 113–22 mm; birds from above 10,000 ft, wing 125–37 mm; tail 44–56 mm.

RANGE New Guinea and Japen Island; sea level to 13,000 ft; rare in the lowlands, common at higher altitudes.

SUBSPECIES Three described:

a) *hirundinacea* (Stresemann); from Setekwa River.
b) *excelsa* (Ogilvie Grant); from Utakwa River, 8,000 ft; like *hirundinacea* but larger (i.e., the name for larger birds from higher altitudes).
c) *barbu* (Stresemann and Paludan); Japen Island; like *hirundinacea* but smaller, upperparts darker and more bluish; wing 111 mm, tail 46 mm.

NESTING In the northern Snow Mountains at about 7,000 ft nests of this species were found in a vertical sink hole in the forest. This sink hole was about fifteen feet across at the entrance and with a chamber about thirty feet across at the bottom. On ledges in the chamber in subdued light were three nests, each with a single young. The nests were bulky, solid masses of plant material (mosses, filmy ferns, etc.) placed against the wall on little ledges. The insides of the nests were smoothly felted but no saliva was apparent. These nests were surprisingly large for a swift, about 100 mm wide and 60 to 75 mm deep outside with an egg 'cup' on top 60 to 65 × 20 to 30 mm deep.

REMARKS This is the common grey-black swift of the higher altitudes. In parties of twenty to thirty birds, it feeds over open country and forest, often high, sometimes low, and with a flight that is moderately straight and quick compared with that of the glossy swiftlet. The flocks of this species seem to range widely. Though this bird has been found near sea level, and then rarely, this was only in the proximity of hills, and the species was absent from the extensive flat country of south New Guinea and the Idenburg River.

***Collocalia vanikorensis* (Quoy and Gaimard)**

Lowland Swiftlet. Length about 5 in.; tail slightly forked; tarsus not feathered. Adult plumage: upperparts bronzy brown or greenish black; underparts smoky or brownish grey; little concealed white in feathers in back; bill relatively large; tarsus usually without feathering; iris brown; bill black; feet dusky. Wing 109–29 mm (varies geographically).

RANGE Celebes, Moluccas, New Guinea and many of the satellite islands and northern Australia to New Caledonia and Solomon Islands; in New Guinea lowlands up to about 4,500 ft.

SUBSPECIES IN NEW GUINEA Four:

a) *granti* (Mayr); New Guinea, Japen and Fergusson and Aru Islands; wing 115–16 mm, tail 49 mm.
b) *tagulae* (Mayr); Louisiade Archipelago, Trobriand Islands and Woodlark Island; like *granti* but larger; wing 124–9 mm.
c) *steini* (Stresemann and Paludan); Numfor and Biak Islands, Geelvink Bay; size medium, colour darker than *granti* and *tagulae*; wing 118–23 mm.
d) *waigeuensis* (Stresemann and Paludan); Waigeu Island; like *steini* but smaller; wing 109–12 mm.

NESTING A small colony was found nesting deep in the complete darkness of a long, small cave in a forested slope, the nests were on the walls of the cave and contained much saliva; eggs two, white.

REMARKS In behaviour this species is much like the mountain swiftlet, and like that species it was absent from much of the extensive lowlands of south New Guinea. It was, however, fairly common over the flats of the Idenburg River where we did not find the mountain swiftlet, and flocks were occasionally seen over the flood plain of the Sepik River.

It is probable that these birds find their way in the complete darkness of their nesting caves by echo-location similar to that used by some bats.

***Collocalia whiteheadi* (Ogilvie-Grant)**

Whitehead's Swiftlet. Length 5½ in.; tail slightly forked; tarsus feathered or not feathered. Adults: upperparts black with bluish or greenish gloss; throat silvery grey contrasting with brownish abdomen; iris brown; bill and feet blackish. Wing 128 (124–42) mm, tail 51 mm, exposed culmen 3–4 mm, tarsus 10 mm.

RANGE Philippines and New Guinea where recorded from sea level to 6,000 ft, but at only a few localities.

SUBSPECIES IN NEW GUINEA One, *papuensis* (Rand).

NESTING Perhaps a cup of mixed feathers and hardened saliva glued to a cave wall?

REMARKS We found this species fairly common only over the Idenburg River lagoon, where it fed in parties of twenty to thirty birds. The New Guinea spine-tailed swift often fed with them, and sometimes a few lowland swiftlets did the same. The flocks were usually very high, much too high to permit collection, but occasionally they came low over the marshes. In the Kubor Mountains, specimens were said to have been taken as they slept under overhanging rocks along mountain streams.

# Order 17 Coraciiformes

## Kingfishers, Rollers, Hornbills, etc.

*Ten families, four in New Guinea*

### Synopsis of Families

1 ALCEDINIDAE Kingfishers. Twenty-four species in New Guinea; length 4–16 in.; bill rather strong and long, tapering to a point (exceptions: blunt in *Clytoceyx* and hooked at tip in *Melidora*); tree birds that sit up watching and dart to the ground for prey; figure 40 and plate 2.

2 MEROPIDAE Bee-eaters. Two similar species in New Guinea; length 8–12 in.; often with elongated central tail feathers; plumage greenish; bill rather long, slightly down-curved and tapering to a point; tree birds that perch in the open and fly out to seize insects on the wing; figure 41.

3 CORACIIDAE Rollers. One species in New Guinea; length 10–11 in.; bill rather short and stout, but wide at gape; plumage predominantly bluish with a large white spot in each spread wing; sits on conspicuous branches and flies out for flying insects; figure 42.

4 BUCEROTIDAE Hornbills. One species in New Guinea; length 30–36 in.; the large bill of this treetop bird is diagnostic; figure 43.

### Family Alcedinidae *Kingfishers*

*(Eighty-seven species, twenty-four in New Guinea)*

This family has a widespread distribution in the warmer parts of the world, and some eighty-seven species are known. In New Guinea there are twenty-four species, ranging in size from four to sixteen inches in length and with a greater variety of form and habit than anywhere else. The colours blue, blue-green, black and white in bold patterns are common, but brown, rufous, buff, and even pinks occur sometimes in more complicated patterns. In some species the sexes are alike, in others different, and the young may be similar to the adult, duller with dark edgings to feathers, or quite different as in *Tanysiptera*. While kingfishers

usually have moderate to short tails and straight, dagger-like bills, one New Guinea group of birds (*Tanysiptera*) may have the central tail feathers greatly elongated and with spatulate or raquet tips, while one species has a bill hooked at the tip (*Melidora*), and another a short, stout, blunt bill (*Clytoceyx*).

Some New Guinea kingfishers frequent the waterways and catch fish, while more of them are dry land birds, found in forest, brush or savannah, which feed on insects, lizards, crabs, frogs or earthworms, or, apparently, any animal of suitable size. Normally, kingfishers sit still, watching for their prey, and dart down to water or earth, or even out to a branch or leaf for it. Two species, *Melidora* and *Clytoceyx*, are said to dig into the earth or leaf litter of the forest floor for their prey. One at least may prove to be nocturnal.

The voices of these kingfishers are often loud, varied, and conspicuous, notably those of the giant kingfisher. When nesting, some species dig tunnels in banks of earth, others in the arboreal mounds of termites, and some are said to nest in holes in trees. No nest material is added, the eggs are white, and the young hatch naked.

In the following, a slight change has been made in the arrangement of genera, and the genus *Syma* is merged in *Halcyon*.

### Key to Kingfishers (Adults only)

1 Central tail feathers greatly elongated, half as long again or more than next pair: *Tanysiptera* (see separate key).
Central tail feathers not greatly longer than next pair: 2.

2 Back and wing-coverts black, spotted or feathers edged yellowish: *Melidora*.
Not so: 3.

3 Head and neck all round white: *Halcyon saurophaga*.
Not so: 4.

4 Top and sides of head and neck ochraceous and black: 5.
Not so: 6.

5 Smaller, length 7–8 in.; lowlands to 3,000 ft: *Halcyon torotoro*.
Larger, length 8½–9 in.; 2,500 to 7,000 ft: *H. megarhynchus*.

6 Size large, length 11–16 in.: 7.
Size medium, 7–10 in.: 9.
Size small, 4½–6½ in.: 11.

7 Crown streaked, blackish and white: *Dacelo leachii*.
Crown black spotted buffy or white: *D. tyro*.
Crown uniform black or brown: 8.

8 Collar on hind neck rufous; bill short and blunt: *Clytoceyx rex*.
Collar on hind neck buffy to white; bill long and pointed: *Dacelo gaudichaud*.

9 Crown deep blue: 10.
Crown greenish blue to dusky green: *Halcyon chloris* and *H. sancta.*
10 Back black: *H. nigrocyanea.*
Back blue or greenish blue: *H. macleayii.*
11 Underparts white, without buffy; length 4–4½ in.: *Alcyone pusilla.*
Underparts mostly ochraceous to buffy: 12.
12 Crown to rump uniform deep blue; length 6–6½ in.: *A. azurea.*
Crown black spotted with shiny deep blue; length 4½–5 in.: *Ceyx lepidus.*
Crown black barred with pale blue; length 5½–6 in.: *Alcedo atthis.*

***Alcedo atthis* (Linnaeus)**

River Kingfisher. Length 5½–6 in. Adults: top of head and neck dark blue to blackish barred with pale blue; side of head with a buffy line above black lores, a black patch behind eye, and blue malar region; side of neck blue with a buffy white streak; centre of back, rump and upper tail-coverts pale shining blue; scapulars, wing-coverts, and exposed parts of quills dull, dark greenish blue, the middle and greater wing-coverts with pale shiny blue spots in the tip of each feather; underparts ochraceous to rufous, the throat paler and more whitish, and a small blue patch on each side of breast; iris brown; bill black; feet reddish. Wing 68 mm, tail 28 mm, exposed culmen 35 mm, tarsus 9 mm.

RANGE Europe to New Guinea and Solomon Islands.

SUBSPECIES IN NEW GUINEA One, *hispidoides* (Lesson); Celebes and Moluccas, western Papuan Islands (Misol and Salawati), north-eastern New Guinea (Astrolabe Bay and China Straits), D'Entrecasteaux and Louisiade Archipelagos, and Bismarck Archipelago, and Admiralty Islands.

NESTING [Generally a burrow in a steep bank of a slow-flowing stream; nest chamber without nest material; eggs white; incubation 19–21 days, by both sexes; young, fed by both parents; fly at 23–27 days. European data.]

REMARKS A fairly common bird of lowland streams, feeding on fish and other small water animals.

***Alcyone azurea* (Latham)**

Azure Kingfisher. Length 6–6½ in. Adult male: upperparts dark, shiny blue except for black wing quills; side of head and neck dark blue except for black lores and buffy white area on side of neck; underparts ochraceous with throat paler, buffy white, and small blue patch on each side of breast; iris dark; bill black (pale at tip in skins); feet red; wing 78 mm, exposed culmen 45 mm, tail 35 mm, tarsus 11 mm.

Female: like male but side of head and patches on sides of breast more blackish.

RANGE Moluccas to New Guinea and Australia.

SUBSPECIES IN NEW GUINEA Three:
a) *wallaceana* (Mathews); Aru Islands.
b) *lessonii* (Cassin); western Papuan Islands (Misol, Batanta, Waigeu), Fergusson Island, lowlands of New Guinea (except range of *ochrogaster*); very like *wallaceana*.
c) *ochrogaster* (Reichenow); north New Guinea between Mamberamo River and Astrolabe Bay area; like *lessonii* but underparts paler.

NESTING In a hole in a bank; eggs, white; size 22·5 × 19·5 mm.

REMARKS The favourite perch of this kingfisher is on a twig or branch overhanging the water of slow moving streams, lakes or swamps in the lowland forests. Its food includes fish, crayfish, insects and spiders.

### *Alcyone pusilla* (Temminck)

Little Kingfisher. Length 4–4½ in. Adult male: upperparts deep shining blue with primaries black; spot in front of eye white, rest of side of head and neck blue with white patch on side of neck; underparts white except for sides of body which are blue, and extend as a triangular point on each side of lower breast; iris brown; bill blackish; feet dark brown; wing 52 mm, exposed culmen 25 mm, tail 20 mm, tarsus 8 mm. Female: like male but side of head duller; wing 51 mm.

RANGE Moluccas to New Guinea, north Australia and Solomon Islands; in New Guinea in lowlands.

SUBSPECIES IN NEW GUINEA Two:
a) *pusilla* (Temminck); western Papuan Islands, Aru Islands, islands of Torres Straits, Fergusson and Goodenough Islands and all New Guinea except the north.
b) *laetior* (Rand); north New Guinea from Geelvink Bay to Astrolabe Bay; like *pusilla* but blue paler and brighter.

NESTING [In a hole in a bank; eggs, white; size 17 × 14 mm. Australian data.]

REMARKS This tiny kingfisher was fairly common on the middle Fly and middle Sepik and Idenburg Rivers, where it was usually seen perched on low shrubbery over the water of lake, river or swamp, or darting across the narrow, wooded, sluggish streams in the forest. Its food includes tiny fish and insects.

***Ceyx lepidus* (Temminck)**

Dwarf Kingfisher. Length $4\frac{1}{2}$–5 in. Adult male: top of head blue-black, each feather with a shiny blue bar or spot near the tip; side of head and neck blue-black with a buffy patch on side of neck; centre of back, rump and upper tail-coverts shining blue; wings and tail blackish, the upper wing-coverts with small shiny blue spots at tips of feathers; throat white or buffy white; rest of underparts buffy orange; iris black; bill black; feet yellow-orange; wing 52 mm, tail 24 mm, exposed culmen 32 mm, tarsus 7 mm. Female: somewhat duller and slightly smaller.

RANGE Philippines, Moluccas, and New Guinea to Solomon Islands; in New Guinea generally distributed from sea level to 4,000 ft.

SUBSPECIES IN NEW GUINEA One, *C. l. solitarius* (Temminck); western Papuan Islands (Misol, Salawati, Batanta, Waigeu), Aru Islands, all New Guinea, Japen, Biak, Karkar Islands, and D'Entrecasteaux Archipelago (Fergusson and Normanby Islands).

REMARKS Though very similar to the fish-eating river kingfisher in appearance, this species seems to dislike fish. Yet even so, it often favours the vicinity of water in wooded areas, and is found along both sluggish lowland and swift mountain streams. It is also found in the forest, perched low in shrub or sapling, and bobbing its head when disturbed by an observer. Its flight is swift and direct. The stomachs of nineteen specimens contained insects, including locusts and a few spiders.

***Melidora macrorhina* (Lesson)**

Hook-billed Kingfisher. Length 10 in. Adult male: top of head and neck black, each feather narrowly edged with light blue; often with a narrow buffy white band on hind neck; back, scapulars and wing-coverts black, each feather with a conspicuous yellowish buff spot or edging at the tip; rump and upper tail-coverts black with finer greenish yellow tips; wing quills blackish, the inner ones with buffy edging and tips; tail brownish black, the quills with narrow buffy tips; side of head with a black patch about eye, with a buffy line above and below it and a black malar streak; a white or buffy spot on side of neck; underparts and side of neck white, the feathers of the throat (and sometimes breast) with obscure blackish edgings; iris brown; bill black; lower mandible whitish; feet grey; wing 118 (114–32) mm, tail 84 mm, exposed culmen 40 mm, tarsus 18 mm. Female: like male but top of head black (in one subspecies, each feather with a minute greenish or buffy spot at tip) and a band of blue extending from eyes backward and across nape. Apparently some adults have ochraceous underparts as do all immatures and, in addition, these have a narrow black edging to each feather.

RANGE New Guinea and some satellite islands; lowlands to 4,000 ft.

SUBSPECIES Three:

a) *waigiuensis* (Hartert); Waigeu Island; wing 126–32 mm.
b) *macrorhina* (Lesson); western Papuan Islands (Misol, Salawati, and Batanta), and New Guinea except the range of *jobiensis* in north New Guinea; like *waigiuensis* but smaller, wing 114–22 mm.
c) *jobiensis* (Salvadori); north New Guinea from south-east corner of Geelvink Bay to Astrolabe Bay area; like *macrorhina* but crown of female nearly uniformly black.

NESTING Nest chambers excavated in arboreal termite mounds about twenty feet up on sides of forest trees; no lining added; eggs two, white, 35 × 28 mm; young naked, with an egg tooth on each mandible, and bill more strongly hooked than in adult; the male was found on the nest in the daytime.

REMARKS The hook-billed kingfisher was a common, solitary, forest bird. During the day, it was found perched in the shaded lower parts of the forest, sometimes near the ground. It was not shy, allowed a close approach, and always sat quietly doing nothing. The natives insisted that this species was nocturnal, and that a distinctive, whistled call of several notes often heard after dark belonged to this bird; an idea that found some support when a bird was flushed from its nest, and disappeared into the forest from whence soon came the characteristic call.

Ramsey wrote that this kingfisher gets most of its food from the ground, digging with its hooked bill among the fallen leaves and debris of the forest floor. The stomachs we examined showed that six birds had eaten only insects; one had eaten a frog and a large walking-stick insect. One bird had the inside of its bill encrusted with mud, as if it had been digging in the ground.

### *Clytoceyx rex* (Sharpe)

Shovel-billed Kingfisher. Length 12–13 in. Adult male: top of head brown, paler anteriorly, darker and more blackish posteriorly; hind neck with a rufous collar edged posteriorly with black; foreback and wings brown or blackish, the wing-coverts narrowly edged with rusty; lower back to upper tail-coverts pale shiny blue; tail black washed with blue; side of head brown with a rufous line at base of bill and another behind the eye and ear-coverts black; side of neck rufous; throat white; rest of underparts rusty rufous; iris brown; bill brown with mandible pale horn-colour; feet pinkish brown; wing 162 (to 180) mm, tail 120 mm, exposed culmen 40 (to 50) mm, tarsus 25 mm. Female: like male but with tail rufous. Immature: similar to adult but upperparts with feathers with rusty tips; ochraceous parts of plumage fringed with

dusky and abdomen white. Some specimens have a few blue feathers at bend of wing.

RANGE New Guinea from Arfak and Snow Mountains to south-eastern New Guinea; lowlands to 7,700 ft.

SUBSPECIES Three, possibly four:

a) *septentrionalis* (Paludan); northern New Guinea (Mamberamo River to Astrolabe Bay area); upperparts generally blackish brown; perhaps not valid.
b) *rex* (Sharpe); south-eastern New Guinea west in south to upper Fly River, in north to Huon Gulf area; like *septentrionalis* but back and crown lighter brown, less blackish; wing 162–70 mm, exposed culmen 40 mm.
c) *imperator* (van Oort); southern New Guinea in Noord River area; like *rex* but larger; wing 180 mm, exposed culmen 50 mm.
d) subspecies?; Arfak; wing 170 mm.

NESTING It has been suggested that this species nests in the ground.

REMARKS The large, heavy, blunt bill, the fact that the bill is often caked with mud (a condition that has persisted in some museum specimens forty-five years old), and the fact that our own observations have been limited to flushing birds from the ground and seeing them fly up into forest trees, all suggest unusual feeding habits.

H. Hamlin has provided first-hand observations as follows: 'The one I saw was on the forest floor investigating around the roots of a tree. Its feet were firmly planted and the neck flattened out as it thrust its bill into the ground at a very slight angle. Then it would push, its tail straight out or down, the head moving occasionally from side to side. It would be at this for as long as a minute, perhaps, then the head would be jerked up. It shook the mud off, snapping its bill a few times. Then, erect and motionless, with the alert look that kingfishers have, for a few seconds, then another shovelful. I was impressed with the effort shown in the process.' Hamlin was told about a bird that got hold of a long worm and, lifting its head, dragged the worm out. He also remembered finding the remains of snails in the stomach of one bird. Our examinations of stomach contents showed a few insect remains in two, and large earthworms in two others. Lizards and beetles have been recorded as food by other observers.

### *Dacelo leachii* (Vigors and Horsfield)

Blue-winged Kookaburra. Length 15–16 in. Adult male: top of head blackish brown and white streaked, the feathers of nape slightly lengthened to form a short crest; hind neck with a white collar; foreback and scapulars black and brown, the feathers with paler tips; lower back

to upper tail-coverts light shiny blue, the latter sometimes dark blue; most wing-coverts tipped with pale, shiny blue forming a bright patch; wing quills black, more or less edged or washed with dark blue, the inner ones narrowly tipped with white, the outer ones with a white patch near the base; tail black, washed with dark blue, the outer feathers tipped with white and inner webs barred black and white; side of head white with narrow, blackish brown streaks; underparts white, sometimes tinged buffy; iris brown; bill brownish black; mandible yellowish white; feet olive; wing 192 mm, tail 118 mm, exposed culmen 65 mm, tarsus 23 mm. Female: like male but tail rufous barred with dark blue and tipped white and underparts with some very narrow dark barring. Immatures: resemble females. Wear and fading is sometimes pronounced in this species.

RANGE Northern Australia and southern New Guinea; lowlands up to 1,400 ft.

SUBSPECIES IN NEW GUINEA Two:

a) *intermedia* (Salvadori); south-eastern New Guinea from Port Moresby area to Oriomo River.

b) *superflua* (Mathews); south New Guinea from Merauke area to Mimika River; like *intermedia* but with the white streaks of the head wider and the white tips to the secondaries wider.

NESTING [In Australia, this species is recorded as nesting in holes in trees; eggs three or four, white; size 45 × 35 mm.] The species may also nest in trees in New Guinea, and, indeed, eighty years ago Ramsey recorded it doing so. It probably also excavates nest cavities in arboreal termite mounds fifteen to thirty feet up in savannah tree trunks. In the Fly River area, we found unused excavations in such termite mounds with an opening of a size to suggest use by this kingfisher and we saw a pair starting an excavation in such a place. The natives say this is its usual habit.

REMARKS The blue-winged kookaburra is a common bird of taller savannah trees. It is usually seen in pairs or small parties of four or five and is usually shy. While walking through the savannah one is rarely out of earshot of at least one party. The common calls were repeated croaks and a rattling call, and sometimes the whole party joins in a cacophonous chorus. When giving the rattle, the tail is cocked and the bill points skyward. The birds often perch in conspicuous places, and presumably it is from such places that they watch the ground for their prey. Though in Australia the role of this bird as a predator on reptiles, birds and fish is stressed, eight stomachs from southern New Guinea contained insects only (beetles, cicadas and grasshoppers).

***Dacelo tyro* (Gray)**

also known as *Sauromarptis tyro*

Aru Giant Kingfisher. Length 13 in. Adults: top and sides of head, neck and foreback black with white or buffy spotting, the spotting finer on the head and becoming coarser on neck and coarsest on foreback; scapulars dead black; lower back to upper tail-coverts pale shiny blue; some of longer tail-coverts darker; tail blue; some of wing-coverts black, some tipped with shiny blue; wing quills blackish more or less washed or edged with blue; underparts white or throat white and rest of underparts buffy; some specimens with feathers of breast with very narrow blackish edgings; iris brown; bill black with mandible whitish; feet olive. Wing 155 (146–56) mm, tail 110 mm, exposed culmen 45 mm, tarsus 20 mm.

RANGE Aru Islands and south New Guinea (Morehead River to Wassi Kussa River).

SUBSPECIES Two:

a) *tyro* (Gray); Aru Islands; underparts and spotting of head and back buffy to ochraceous.
b) *archboldi* (Rand); southern New Guinea; like *tyro* but underparts nearly white; spotting on head and back nearly white.

NESTING Nest not found, but natives who said that *D. leachii* nested in termite mounds said this species nested in holes in trees; a clue for the next field observer to follow up.

REMARKS This giant kingfisher was a common species in the savannahs of the Wassi Kussa area; avoiding the forests. It was usually seen in pairs or in loose parties of three or four, sitting well up in the savannah trees and usually being very wary. The call is a loud throaty 'kurk' repeated a number of times and somewhat similar to certain calls of *D. leachii*. The birds sit upright and the tail is occasionally flicked up over the back, both when calling and when silent.

The food of this species is insects, including beetles, ants, winged ants, and a five-inch long walking-stick insect, judging by six stomachs examined. Sometimes the birds fly down to the ground for their prey; probably some is taken from leaves and twigs, and one bird was seen to flutter about the edge of a savannah tree, apparently catching winged ants, with which its stomach proved to be crammed.

***Dacelo gaudichaud* (Quoy and Gaimard)**

also known as *Sauromarptis gaudichaud*

Rufous-bellied Giant Kingfisher. Length 11 in. Adult male: crown, nape, foreback and scapulars black; a buffy white line from nostril to gape (sometimes meeting across forehead) and a buffy white collar on back

and sides of neck; lower back and rump pale shiny blue becoming dark blue on upper tail-coverts; most of wing-coverts black with light shining blue or darker blue tips; wing quills black, more or less edged with dark blue; tail dark blue; side of head black with a buffy white area at base of bill and another behind upper part of eye; chin and throat white; rest of underparts rufous; iris brown; bill whitish with upper parts of maxilla dusky; feet grey; wing 130 mm, tail 86 mm, exposed culmen 50 mm, tarsus 14 mm. Female: like male but tail rufous. Immatures: similar to female but with dusky edging to feathers of hind neck and underparts and bill blackish.

RANGE Western Papuan Islands (Misol, Salawati, Batanta, Gebe and Waigeu), Aru Islands, islands of Geelvink Bay (Meos, Num, Japen), Heath Island and all New Guinea; lowlands up to 1,600 ft.

NESTING In a chamber excavated in an arboreal termite mound. Such termite nests with appropriate sized holes were seen commonly in the Fly River country, and a pair of birds were seen excavating a nest cavity in a termite mound twenty feet up on the trunk of a tree. Bergman recorded the eggs as two in number, and white in colour.

REMARKS This is one of the commonest New Guinea kingfishers. It is a dry land bird living in forest, forest edge, second growth and savannah and is often seen perched well up in the trees as well as on low branches. It rests both on exposed dead branches and also well concealed in foliage. Its voice is often heard and its repertoire includes a short rattle, a short, loud 'chok' repeated a number of times, and a low, plaintive call. This bird's food consists mostly of insects; of thirteen stomachs examined, ten contained insects only, two contained insects and a crab each, and one contained a lizard.

### *Halcyon torotoro* (Lesson)

also known as *Syma torotoro*

Lesser Yellow-billed Kingfisher. Length 7–8 in. Adult male: top and side of head and neck deep ochraceous except for a small black area around front of eye and a black patch on each side of hind neck; foreback black bordering rufous of hind neck; rest of back and scapulars dull olive-green to greenish blue; upper tail-coverts light blue; tail darker blue; wing-coverts blackish, tipped and edged with greenish blue; wing quills black edged with green or blue; underparts variably paler ochraceous than that of top of head, often much paler and rusty or buffy white on throat and abdomen; iris brown; bill yellow (sometimes with black streaks on culmen); feet yellow; wing 80 (71–84) mm, tail 62 mm, bill 27–39 mm, tarsus 14 mm. Female: similar but with a black patch of varying size on crown and black patches on sides of neck often joined across hind neck. The immature has a black bill.

RANGE New Guinea, many satellite islands, and northern Australia (Cape York); lowlands to 1,500 ft, rarely to 3,000 ft.

SUBSPECIES IN NEW GUINEA Six:

a) *torotoro* (Lesson); western Papuan Islands (Misol, Salawati, Batanta, Waigeu), Japen, and western New Guinea (east in north to Astrolabe Bay, in south to Etna Bay); black of crown of female nearly or quite reaching base of bill; male wing 76–83 mm, female wing 78–81 mm, bill 36 mm.

b) *tentelare* (Hartert); Aru Islands; like *torotoro* but black patch on crown smaller and separated from base of bill by a rufous area; wing smaller; male wing 74–80 mm, bill 31·5 mm.

c) *pseustes* (Mathews) (often mis-spelled *pseutes*); south New Guinea between the Mimika and Fly Rivers, but excluding the range of *brevirostris*; apparently very like *tentelare*; male wing 70–78 mm, bill 29–33 mm.

d) *brevirostris* (Rand); a small area in south New Guinea between Morehead and Wassi Kussa Rivers; like *pseustes* but underparts paler and bill shorter; male wing 71–76 mm, bill 27–30 mm.

e) *meeki* (Rothschild and Hartert); south-eastern New Guinea (west in the north to Huon Peninsula, in the south to Hall Sound); like *brevirostris* in pale underparts but bill longer; male wing 71–74 mm, bill 29–32 mm.

f) *ochracea* (Rothschild and Hartert); D'Entrecasteaux Archipelago (Fergusson, Goodenough and Normanby); differs from all the above in having the ochraceous parts of plumage deeper ochraceous; size larger; male wing 84 mm, bill 39 mm.

NESTING A tunnel and nest chamber were excavated by the bird in an arboreal termite nest ten feet up on the trunk of a large tree in heavy forest; no material added; a single white egg, 25 × 22 mm.

REMARKS This kingfisher which has the cutting edges of its bill modified into a saw-tooth margin is a common forest bird. It spends much of its time perched in the branches of lower trees and its call is a distinctive sound in the forest. It is a loud, clear whistle, recalling a police whistle or a tin whistle with a loose piece of wood in it. The food of this bird is chiefly insect, including large dragonflies, and occasionally also lizards and earthworms, judging by the examination of the stomachs of nine specimens.

### *Halcyon megarhynchus* (Salvadori)

also known as *Syma megarhyncha*

Mountain Yellow-billed Kingfisher. Length 8½–9 in. Adult male: top and sides of head and neck ochraceous except for a small black area about

forepart of eye, and a black patch on each side of hind neck; upper back with a black area bordering ochraceous of hind neck; rest of body bluish green or greenish blue; upper tail-coverts paler blue; tail dark blue; lesser upper wing-coverts black, others green-blue; underparts ochraceous often with throat and abdomen much paler, buffy white; iris brown; bill yellow with black streak on culmen; feet brownish yellow; wing 90 mm, tail 65 mm, exposed culmen 36 mm, tarsus 12 mm. Female: like male but more black on bill, large patch of black on crown, and black patches on sides of neck meet across hind neck as a black bar. Immatures have black bills.

RANGE Mountains of New Guinea from Weyland and Snow Mountains to those of Huon Peninsula and south-eastern New Guinea; from 2,500 to 7,000 ft.

SUBSPECIES Three:

a) *megarhynchus* (Salvadori); south-eastern New Guinea; bill, including tip, variegated with black.
b) *sellamontis* (Reichenow); Huon Peninsula; distal half of bill yellow, not black.
c) *wellsi* (Mathews); Snow and Weyland Mountains; like *megarhynchus* but back bluer, less greenish.

REMARKS The mountain yellow-billed kingfisher is very similar to the lowland, lesser yellow-billed species, differing chiefly in its larger size. The mountain species is also a forest bird that spends much of its time well up in the trees, and its call, like that of *H. torotoro*, is a loud, rich trill, recalling that of the cuckoo, *Cacomantis pyrrophanus*. This kingfisher sits quietly concealed among leaves for long periods, and is shy and very difficult to locate. Its food is insects and lizards.

***Halcyon nigrocyanea* (Wallace)**

Blue-black Kingfisher. Length 9 in. Adult male: crown dark blue edged on the sides and nape with a band of pale blue; upper back and scapulars black; lower back and rump pale shiny blue; upper tail-coverts deeper blue; tail dark blue; upper wing-coverts shiny blue; wing quills black edged with blue; sides of head, neck and body black; rest of underparts vary with the subspecies, either blue with a little white from the bases of feathers showing in the throat, or blue with throat and a band on lower breast white, or throat white, breast blue followed by a narrow white band and abdomen rufous; iris brown; bill black (sometimes with base of lower mandible yellowish); feet grey or blackish; wing 93 mm, tail 64 mm, exposed culmen 45 mm, tarsus 12 mm. Female: like male but throat and abdomen white and with a broad blue breast band. Immatures: like female but duller and with rufous on the abdomen.

RANGE Some western Papuan Islands and New Guinea lowlands up to 2,000 ft.

SUBSPECIES Three quite different ones, in male plumage:

a) *nigrocyanea* (Wallace); Salawati, Batanta, and western New Guinea (east to head of Geelvink Bay and on south coast to Princess Marianne Straits); throat white, upper breast blue, lower breast with a white band, abdomen blue.

b) *stictolaema* (Salvadori); south-eastern New Guinea (from Fly River to Mt Cameroon); throat blue, more or less mottled with white, breast and abdomen uniform blue.

c) *quadricolor* (Oustalet); Japen and north New Guinea between Geelvink Bay and Astrolabe Bay; like *nigrocyanea* but breast and abdomen rufous.

REMARKS On the middle Fly River this dark kingfisher was a rare bird. It was found in a flooded tea-tree swamp and along a small forest stream; the birds were perched on branches a few feet or yards above the water. Apparently the bird obtains food both from the water and from land or tree branches, as the examination of three stomachs showed. They contained the remains of crabs, fish, and a lizard.

### *Halcyon macleayii* (Jardine and Selby)

Forest Kingfisher. Length 8 in. Adult male: top and sides of head blue-black except for a white spot behind each nostril; back of neck with a white collar joining white of throat; back either blue or bluish green (depending on subspecies); upper wing-coverts blue; upper tail-coverts shiny blue or pale blue; tail black glossed blue; wing quills black more or less glossed blue and with a concealed (in folded wing) white area near centre of quills giving a white patch in flight; underparts white often with an ochraceous wash on sides of body; wing 93 (89–96) mm, tail 54 mm, exposed culmen 37 mm, tarsus 12 mm. Female: like male but white band on hind neck interrupted in centre.

RANGE Northern and eastern Australia and eastern New Guinea; Australian birds migrate in non-breeding season to eastern and central New Guinea and satellite islands and New Britain; lowlands up to 1,400 (rarely 4,800) ft.

SUBSPECIES IN NEW GUINEA Three:

a) *macleayii* (Jardine and Selby); northern and eastern Australia, on migration to the Kei Islands, eastern New Guinea (west to Mimika River and Astrolabe Bay), some eastern satellite islands and New Britain; back greenish blue.

b) *elisabeth* (Heine); eastern New Guinea west to Hall Sound and

Astrolabe Bay; like *macleayii* but back bluish, lacking a greenish tinge.

c) *insularis* (Berlepsch); Aru Islands (doubtful form).

NESTING In holes in hollow boughs or in tunnels dug in nests of termites; eggs five, white, according to Ramsay's data.

REMARKS This species is not uncommon and is usually found on the forest edge or in more densely wooded savannah where it sits on an exposed perch. Its recorded food includes caterpillars, grasshoppers, a centipede, and a spider. The paler, blue-green backed migrant from Australia has been recorded from 3 April to 6 September.

### *Halcyon sancta* (Vigors and Horsfield)

Sacred Kingfisher. Length 7–8 in. Adult male: crown, back and scapulars and lesser wing-coverts dark bluish green, more blackish on foreback; a buffy white spot on each side of forehead and an obscure whitish spot on nape; a black band on hind neck which is continuous with the black band across face from auriculars to lores followed by a buffy white collar on hind neck which joins white of throat; greater wing-coverts blue and exposed edges of wing quills also blue; rump and upper tail-coverts paler shiny blue; tail blue; throat white, rest of underparts white more or less tinged buffy or ochraceous; under wing-coverts and inner edges of wing quills buffy; iris brown; bill black with basal two-thirds of mandible white; feet grey-brown; wing 90 mm, tail 65 mm, exposed culmen 38 mm, tarsus 14 mm. Female: similar but with some obscure barring on sides of breast and in pale collar on hind neck; young birds like female.

RANGE Australia, New Zealand, Norfolk Island, Lord Howe Island, New Caledonia and Loyalty Islands; Australian birds migrate in the non-breeding season to the New Guinea region and as far as the Solomon Islands, the Moluccas, and the Lesser Sunda Islands. A few individuals may be found in the wintering area throughout the year.

SUBSPECIES IN NEW GUINEA One, *sancta* (Vigors and Horsfield); breeds in eastern and southern Australia and Tasmania and winters north to Solomon Islands and Lesser Sunda Islands; in New Guinea and satellite islands common in the lowlands and sometimes up to 7,500 ft.

REMARKS The sacred kingfisher, in season, is a common, conspicuous bird on the forest edge, river edges, gardens, towns, beach vegetation and savannah country; wherever the lowland is without closed forest. It is a familiar, conspicuous bird sitting on conspicuous perches and darting down to the ground for its prey which has been recorded as insects (including grasshoppers) and crabs. Our records included all months but January, February and June. On Daru Island in south New

Guinea in late March, we recorded that the species suddenly became common as though an influx of migrants had just arrived, and the same was true in April and May in the Wahgi Valley.

***Halcyon chloris* (Boddaert)**

Mangrove Kingfisher. Length 8–10 in. Adults: crown and back dusky olive to greenish blue depending on the subspecies; a white or buffy white spot each side of forehead, an obscure whitish spot in nape, and followed by a black bar continuous with black stripe from auriculars to lores, followed by a white collar which joins white of throat; scapulars and lesser wing-coverts like back; greater wing-coverts and wing quills edged with brighter blue; rump and upper tail-coverts brighter, paler blue than back; underparts and under wing-coverts white; iris brown; bill black, pale at base of mandible; feet reddish brown. Wing 112 (92–117) mm, tail 70 mm, exposed culmen 50 mm, tarsus 18 mm. Immature birds have considerable obscure barring on breast, sides of body and in pale collar on hind neck and are somewhat smaller.

RANGE From Red Sea and southern Asia through the Philippines and the Malay Archipelago to New Guinea, northern Australia and the islands of the south-west Pacific as far as Samoa.

SUBSPECIES IN NEW GUINEA Three:

a) *chloris* (Boddaert); Celebes and Lesser Sunda Islands, western Papuan Islands (Misol, Salawati, Gagi, Waigeu) and western and southern coasts of Vogelkop and Onin Peninsula; general colour above bright bluish green; wing 117 mm.
b) *sordida* (Gould); coasts of northern Australia, islands of Torres Straits, Aru Islands, and south coast of New Guinea from Mimika River to China Straits; general colour of crown and back dusky olive-green; wing 112 mm.
c) *colona* (Hartert); satellite islands off eastern New Guinea (Bonvouloir group, Alcester Island, Egum group, Duchateau Island, Misima, Tagula, and Rossel Islands; like *sordida* but smaller and even darker, more dusky above; wing 92 mm.

NESTING [In a hole in a tree or a termite mound; eggs three, white; size 31·5 × 26·5 mm. Australian data.]

REMARKS Despite the enormous range of this species, it seems to be an uncommon bird in the New Guinea area. It is recorded elsewhere as being found in mangrove swamps and second growth and the few we have seen in New Guinea were in mangrove swamps and had eaten crabs.

This species is very similar to the sacred kingfisher, but it is larger (except for the eastern New Guinea island race) and the single most diagnostic character separating the two species in this area is the buffy

or ochraceous coloration on the sides of the body (usually) and in the under wing (always) of *sancta*; these parts are white in *chloris*.

***Halcyon saurophaga* (Gould)**

White-headed Kingfisher. Length 10½–11½ in. Adults: all underparts, and head and neck all round, and foreback white except for a few blue feathers behind eye; rest of upperparts blue, more blue-green on centre of back and paler and brighter on rump and upper tail-coverts; iris brown; bill black with base of mandible whitish; feet brownish black. Wing 125 mm, tail 80 mm, exposed culmen 55 mm, tarsus 15 mm.

RANGE Moluccas to northern New Guinea and its satellite islands, Bismarck Archipelago and Solomon Islands.

SUBSPECIES IN NEW GUINEA One, *saurophaga* (Gould); northern Moluccas, western Papuan Islands, the northern coast of New Guinea and satellite islands from Sorong to D'Entrecasteaux Archipelago, Louisiade Archipelago, Bismarck Archipelago and Solomon Islands.

NESTING In hole in a tree, one recorded about twelve feet up; one nest held two young. (Bergman.)

REMARKS This is a coastal species and more particularly a small island species said to prefer coconut groves, coral cliffs and mangrove swamps. Its diet in various parts of its range is said to include crabs, lizards, insects and fish.

**Tanysiptera**

Paradise Kingfisher. The adults of this genus are immediately recognized by the greatly elongated central tail feathers, which in some species are attenuated for part of their length, and with spatulate or raquet tips. The plumage includes blues, blacks and whites, blue and cinnamon, and brown and pinks. The sexes are very similar. The immatures have central tail feathers little elongated, and are duller, often patterned brown and buffy. These are forest kingfishers, feeding chiefly on insects.

**Key to Paradise Kingfishers (Adults)**

1 Breast and abdomen blue (Numfor only): *Tanysiptera carolinae.*
  Breast and abdomen pink to scarlet: 2.
  Breast and abdomen white: 3.
  Breast and abdomen buffy ochraceous: *T. sylvia.*
2 Crown and mantle black: *T. nympha.*
  Crown and mantle brown: *T. danae.*
3 Elongated tail feathers nearly uniform in width (Kofiau only): *T. ellioti.*
  Elongated tail feathers with spatulate tip: 4.

4 Top and side of head pale, shiny blue (Biak only): *T. riedelii.*
Side of head black or blue-black: 5.
5 Larger, wing more than 90 mm: *T. galatea.*
Smaller, wing less than 90 mm: *T. hydrocharis.*

***Tanysiptera hydrocharis* (Gray)**

Aru Paradise Kingfisher. Length 12 in. (including long centre tail feathers). Adults: crown light blue, blackish on forehead and brighter along sides of head; side of head blue-black; sides and back of neck, upper back and scapulars black washed with blue; upper wing-coverts light blue; wing quills black washed with blue on exposed edges; lower back to upper tail-coverts white; central tail feathers blue with spatulate white tips; rest of tail feathers blue; underparts white; iris brown; bill red; feet dusky reddish olive. Wing 86 mm; tail 70 mm, with central tail feathers 180 mm; exposed culmen 25 mm; tarsus 15 mm. Young: are brownish above, ochraceous streaked dusky below and with only a little blue on the central tail feathers which are not elongated.

RANGE Aru Islands and south New Guinea between Wassi Kussa and Fly Rivers.

REMARKS The habits and habitat of this species are very like those of *T. galatea*, to which it is very similar except for being smaller. Both species live in the Fly River area.

***Tanysiptera galatea* (Gray)**

Common Paradise Kingfisher. Length 13–17 in. Adults: crown and lesser upper wing-coverts light blue (dark blue in one subspecies); side of head, neck, upper back, greater wing-coverts and wing quills black more or less washed blue; lower back, rump, upper tail-coverts white; central tail feathers greatly lengthened, blue or blue and white, with expanded spatulate white tips; rest of tail feathers short, white with or without blue margins; underparts white; iris brown; bill red; feet dusky. Wing 108 mm, tail 100 mm (with elongated central tail feathers to 300 mm), exposed culmen 35 mm, tarsus 17 mm. Immatures have only slightly lengthened central tail feathers and are mostly brown above with underparts buffy to ochraceous and many feathers margined with blackish; there is some blue in the nape.

RANGE Moluccas to New Guinea area; lowland forest to 1,000 ft. The species seems absent from north-eastern New Guinea (Astrolabe Bay to Kumusi River), and south-western New Guinea (Etna Bay to Digul River) and Misol Island; in New Guinea lowlands up to 1,000 ft.

SUBSPECIES IN NEW GUINEA Five:
a) *galatea* (Gray); western Papuan Islands (Salawati, Batanta, Waigeu,

Gebe, but not Misol) and north-western New Guinea (east on the south coast to Triton Bay, on the north coast to eastern Geelvink Bay); wing 108 mm.

b) *minor* (Salvadori and D'Albertis); south-eastern New Guinea, west in the south to the Digul River and in the north to the Kumusi River; like *galatea* but bill averages smaller; wing 101–7 mm.

c) *meyeri* (Salvadori); north New Guinea between Mamberamo River and upper Ramu River; like *galatea* but with much more white in base of central tail feathers; wing 98–110 mm.

d) *vulcani* (Rothschild and Hartert); Vulcan Island; like *meyerii* but larger; wing 109–18 mm.

e) *rosselinana* (Tristram); Rossel Island, Louisiade Archipelago; differs from the above in having the outer tail feathers all white, basal half of central tail feathers all white, crown duller blue, and back with a heavier blue wash; wing 110 mm.

NESTING In a hole in a branch (?) or in a termite nest; eggs five, white.

REMARKS Along the Fly River, this paradise kingfisher was a common bird usually found perched on some twig or small branch within a few yards of the ground in the heavily shaded forest. The bird usually sat quiet and upright, tail pointed down, apparently paying little attention to its surroundings and could be closely approached. When alarmed, it flew only a short distance to another similar perch. Sometimes, while perching, the long tail was raised and depressed through a ninety degree angle, the long streamers attracting attention to a bird that otherwise would have escaped notice. The song, a series of plaintive calls quickening to a soft trill, was often heard in October, and couples were seen occasionally chasing one another, though no breeding was going on. When feeding, the bird usually darted down to seize its insect prey from the ground but, on one occasion, a bird darted to a small branch ten feet up for an insect. Six stomachs examined contained insects, including caterpillars, and two contained large earthworms.

Though usually solitary, on one occasion, four or more birds were calling continually from the leafy substage trees twenty to thirty feet up. The birds were sitting up straight, as is their custom, but as a bird called, its tail was spread. Frequently one bird darted at another and a short chase followed, but sometimes the attacked bird clung to the opposite side of the branch, spreading wings and tail in a defence display. A few times, the birds met and fell some feet together, fluttering. As the birds were not breeding at this time, the meaning of this is obscure.

***Tanysiptera riedelii* (Verreaux)**

Biak Paradise Kingfisher. Length 14 in. Adults: top and sides of head and neck, upper back and lesser wing-coverts light blue, the bases of the

feathers black; sides of back, scapulars, some wing-coverts, and wing quills deep blue; lower back to upper tail-coverts white; elongated central tail feathers white basally, then pale blue, then with white spatulate tip; rest of tail feathers white narrowly edged blue; underparts white; iris brown; bill red; feet dusky. Wing 117 mm, tail 190 mm, exposed culmen 35 mm, tarsus 15 mm.

RANGE Biak Island.

REMARKS This is a geographical representative of *T. galatea* but quite distinct in the pale brilliant blue of crown, side of head and upper back. Ripley recorded this species only in the deep forest along rocky stream beds, and found it had a low, distinctive, faintly barking call, usually of one or two notes.

***Tanysiptera carolinae* (Schlegel)**

Numfor Paradise Kingfisher. Length 14–15 in. Adults: upperparts very deep blue, brighter on crown, nape, and some upper wing-coverts; lower back to upper tail-coverts white; tail white except for narrow part of elongated central pair of feathers which is blue; sides of head and underparts deep blue; under tail-coverts white; iris brown; bill red; feet dusky. Wing 115 (105–15) mm, tail 95 mm, central tail feathers 185 mm, exposed culmen 36 mm, tarsus 19 mm. Young birds are ochraceous on the underparts.

RANGE Numfor Island, Geelvink Bay.

REMARKS This endemic Numfor species is a geographical representative of *T. galatea*, but very different in the blue underparts.

***Tanysiptera ellioti* (Sharpe)**

Kofiau Paradise Kingfisher. Length 13 in. Adults: top of head and smaller wing-coverts bright blue; side of head, upper back, scapulars, greater wing-coverts, and exposed surface of wing quills deep blue; lower back to upper tail-coverts white; tail feathers white, the elongated central ones not attenuated and without pronounced spatulate tip; underparts white with deep blue streaks in flanks; iris brown; bill red; feet dusky. Wing 108 mm, tail 100 mm without central tail feathers which measure 175 mm, exposed culmen 30 mm, tarsus 14 mm.

RANGE Kofiau Island, near Misol Island west of New Guinea.

REMARKS This is another geographical representative of *T. galatea* which is an endemic species with a very small range. The nature of the central tail feathers, without attenuation and without pronounced spatulate tip, is the most distinctive character.

***Tanysiptera nympha* (Gray)**

Pink-breasted Paradise Kingfisher. Length 12–13 in. Adults: crown deep rich blue (forehead sometimes black), paler on nape; lesser wing-coverts blue; side of head, upper back and scapulars black without bluish tinge; some wing-coverts and wing quills blackish; lower back to upper tail-coverts reddish pink; central tail feathers elongated but only slightly attenuated and with slight enlargement at tip, blue with a little white at base (sometimes) and a white tip; underparts reddish pink tinged buffy on flanks; iris brown; bill and feet red. Wing 95 mm, tail 80 mm without elongated central feathers which measure 163 mm, exposed culmen 34 mm, tarsus 18 mm. The young bird is mostly brown above with blue on nape and tail and partly, at least, ochraceous below with black edgings to feathers.

RANGE Known from several scattered localities in New Guinea: west coast of Vogelkop, Onin Peninsula to Etna Bay, head of Geelvink Bay, Huon Peninsula, Huon Gulf and upper Watut River; lowlands up to 3,000 ft.

REMARKS This seems to be a rare bird of second growth and forest and is occasionally found in mangrove swamps.

***Tanysiptera danae* (Sharpe)**

Brown-backed Paradise Kingfisher. Length 10 in. Adult male: crown, hind neck, foreback and scapulars ochraceous brown; side of head more ochraceous with indistinct ochraceous eyebrow stripe; lower back to upper tail-coverts red-pink; central tail feathers blue, slightly attenuated and with a slightly expanded white tip; some wing-coverts light, some dark blue, rest blackish like wing quills; throat whitish; rest of underparts pink with a rusty wash on lower flanks; iris brown; bill red; feet dull red; wing 87 mm, tail 65 mm excluding elongated central tail feathers which measure 135 mm, exposed culmen 30 mm, tarsus 14 mm. Female similar but with throat buffy. Young much duller than adult with underparts mostly ochraceous; central tail feathers not elongated.

RANGE South-eastern New Guinea (west in the north to Waria River, in south to Aroa River); lowlands and foothills.

REMARKS This is a close relative of *T. nympha*.

***Tanysiptera sylvia* (Gould)**

Australian Paradise Kingfisher. Length 14½ in. Adults: crown and wing-coverts blue, paler on nape; sides of head, hind neck and upper back black, the last with a large white patch; scapulars dark blue; wing quills black washed or edged with blue; lower back, upper tail-coverts and central tail feathers white, the last attenuated but without notice-

able enlargement at the tip; underparts and sides of neck rusty cinnamon; iris brown; bill red; feet red. Wing 100 mm, tail 72 mm without elongated central quills which measure up to 250 mm, exposed culmen 29 mm, tarsus 16 mm.

Some specimens have the back patch buffy, the white upper tail-coverts mixed or tipped with blue-black and a much shorter central pair of tail feathers edged blue basally. Immatures: apparently are similar to adult but paler and duller, with a dusky bill and shorter central tail feathers.

RANGE Northern Queensland and eastern New Guinea and Bismarck Archipelago. Queensland birds winter in southern and northern New Guinea. In New Guinea in lowlands and foothills.

SUBSPECIES IN NEW GUINEA Two:

a) *salvadoriana* (Ramsay); south-eastern New Guinea from Hall Sound to Kemp Welch River and Moroka district.
b) *sylvia* (Gould); northern Queensland; winter in southern New Guinea from Setekwa to Fly Rivers, also collected in north New Guinea near Humboldt Bay; like *salvadorina* but paler above and below.

NEST [In a termite nest; eggs three to four, white; size 27 × 22·5 mm. Australian data.]

REMARKS This seems to be a rare bird.

## Family Meropidae *Bee-eaters*

*(Thirty-two species, two in New Guinea)*
A family of thirty-two species from the warmer parts of the Old World. Only two species occur in New Guinea, one resident and one as a non-breeding visitor from Australia. These are birds of the open, catching their insect food on the wing, and they are skilful flyers which sometimes circle about like swallows. At other times they may perch on exposed perches and fly-catch. These habits with the long, slender, curved bill, the green, rufous, and blue in the plumage, and in the adults the elongated, attenuated central tail feathers, make the identification of bee-eaters easy. For a study of one species see Comrie-Smith (1930), Notes on the Rainbow-Bird, *Emu*, *30*, 64–66.

### Key to Bee-eaters (Adults)

Tail quills blue, little different from tail-coverts; throat chestnut: *Merops philippinus*.

Tail quills black, contrasting with blue upper tail-coverts; throat with black patch: *M. ornatus.*

***Merops ornatus* (Latham)**

Rainbow Bee-eater. Length 10 in. (without elongated, attenuated, pointed central tail feathers, 8 in.). Adults: forecrown and forehead green; hind crown and nape rufous; upper back, upper wing-coverts and secondaries green, more or less glossed golden and changing on inner scapulars to pale blue; lower back and rump pale shiny blue; tail black (sometimes glossed blue or outer feathers margined with black); wing quills rufous, glossed with green on outer webs and tipped with black; side of head with a black band from bill through eye to ear-coverts and edged above back to eye with pale green, and edged below with a pale blue line; chin yellow; throat chestnut followed by a cross bar or patch of black; breast green, glossed with bronze especially on sides and changing to pale blue on abdomen and bright blue on under tail-coverts; under wing rufous; iris red; bill black; legs grey. Male wing 118 (104–18) mm, tail 75 mm (without central, attenuated, elongated pair of quills which measure 120 mm), culmen 36 mm, tarsus 12 mm. Female: slightly smaller. Immatures: duller, more bluish, without dark patch on throat, and central tail feathers not elongated nor attenuated at tip.

RANGE Breeds in Australia and in Moa, Southwest Islands. On migration or wintering to Lesser Sunda Islands, Bismarck Archipelago, Solomon Islands and New Guinea, where common in lowlands up to 7,500 ft.

REMARKS This Australian migrant is a common bird at times in the mid-mountain grassland, over the forest and in the savannah and other grass country of the lowlands. Singly, or in parties of four or five, these birds may spend much of their time on conspicuous perches on treetops, or shrubs, from which they dart out after insects, flycatcher fashion, or they may soar and sail about, feeding on the wing or even indulging in 'play'. We recorded this species from March to September, and in the middle Fly River area it became very common in late September, as it did on the Idenburg River in April.

***Merops philippinus* (Linnaeus)**

Blue-tailed Bee-eater. Length 10½–11½ in. (without elongated, pointed, central tail feathers, 9 in.). Adults: forehead with a narrow line of blue; crown bronzy green (or golden-olive) paler on neck and foreback and greener on upper wing-coverts and changing to light blue on scapulars; lower back and rump light blue; upper tail-coverts and tail blue except for distal part of elongated, pointed central pair which is

blackish; wing quills green externally tipped with black; side of head with black band from bill through eye to ear-coverts with a narrow pale blue line above it from nostril to eye, and another below it to below ear-coverts; chin yellowish white; throat chestnut changing to golden-green on breast and pale blue on abdomen and under tail-coverts; under wing-coverts rufous and basal parts of inner webs of wing quills also rufous; iris red or brown; bill black; feet grey to brown. Wing 130 mm (without elongated, pointed central quills which measure 145 mm), culmen 50 mm, tarsus 12 mm. Immatures: duller and without long, pointed central tail feathers.

RANGE Breeds in southern Asia (India to south-eastern China) and the Philippines, and winters south in Malay Archipelago; also breeds in Bismarck Archipelago and New Guinea.

SUBSPECIES IN NEW GUINEA One, *salvadorii* (Meyer); New Britain, Long Island, and in New Guinea on north coast (Sentani Lake, Astrolabe Bay), Markham Valley(?) and in southern New Guinea (Princess Marianne Straits – Fly River); in lowland.

NESTING [Excavates nest tunnels (up to four feet long) in banks of rivers; eggs four to seven, white; size 23 × 20 mm. Indian data.]

REMARKS This bee-eater is apparently of uncommon and local occurrence in the grass and shrubbery dotted country in New Guinea.

## Family Coraciidae *Rollers*

*(Seventeen species, one in New Guinea)*
A small family of seventeen species found in the warmer parts of the Old World, and with only one species reaching the New Guinea–Australian region. Its size, coloration, and behaviour make it easily identifiable.

### *Eurystomus orientalis* (Linnaeus)

Broad-billed Roller or Dollar Bird. Length 10–11 in. Adults: top and sides of head brown changing to paler brown washed with greenish blue on upper back, and dull greenish blue on scapulars, lower back, and upper tail-coverts; tail dark blue with a broad, black terminal band; lesser wing-coverts dusky greenish blue; greater wing-coverts light blue; wing quills black more or less edged with deep blue and with a pale blue area near the centre; throat brown with a large patch of purplish blue; breast bluish brown changing to light blue on abdomen; on the under wing the pale area near the middle of the wing quills makes a conspicuous pale spot in the spread wing, very obvious in flight; iris

brown; bill red, with distal half of culmen black; feet red with black nails. Wing 195 (190–210) mm, tail 95 mm, culmen 32 mm, tarsus 20 mm.

RANGE From India and north-eastern Asia to Australia; in New Guinea from sea level to 5,000 ft.

SUBSPECIES IN NEW GUINEA Two:

a) *waigiouensis* (Elliot); western Papuan Islands (Misol, Batanta, Waigeu), New Guinea, Japen, Karkar Island, D'Entrecasteaux and Louisiade Archipelago.
b) *pacificus* (Latham); breeds in Australia, wintering to Moluccas, Celebes, New Guinea region and Bismarck Archipelago; like *waigiouensis* but paler (it has been suggested that *orientalis* should apply to this bird, and that *cyanicollis*, formerly called *orientalis*, of the Indies, reaches Waigeu in migration).

NESTING [In a hole in a tree; eggs three to five, white; size 35 × 27·5 mm. Australian data.]

REMARKS The dollar bird is fairly common and conspicuous, perched alone on some commanding perch on the forest edge, savannah, or brushland, from which it swoops out to snatch up insects in flight, or flies about, catching insects on the wing, when the pale, coin-like patches on its wing quills, which give the bird its name, are very evident.

## Family Bucerotidae *Hornbills*

*(Forty-five species, one in New Guinea)*

An Old World family found in Africa, southern Asia and the Malay countries. There are some forty-five species with one reaching New Guinea and Solomon Islands. For a review of some of the remarkable breeding habits in this family, see Moreau (1937), The Comparative Breeding Biology of the African Hornbills, *Proc. Zool. Soc.*, *107A*, 331–346.

### *Aceros plicatus* (Forster)

also known as *Rhyticeros plicatus*

Papuan Hornbill. Length 30–36 in. Adult male: head and neck all round golden ochraceous or buffy ochraceous; rest of plumage black except for white tail; iris red-brown; bill dirty white with base brownish red; naked skin around eye and naked gular area pale bluish green; feet greyish black; adults with four to eight folds on casque; wing 450 (402–70) mm, tail 260 mm, bill 215 (181–224) mm, tarsus 60 mm.

Female: plumage entirely black except for white tail; bill shorter than in male and with fewer (four to six) folds on the casque, somewhat smaller than male; wing 381–417 mm, bill 148–175 mm. The young birds have no folds on the casque. Immature females resemble the adult males, a rather unusual condition.

RANGE Burma and south through the Malay Archipelago to New Guinea, Bismarck Archipelago, and Solomon Islands; lowlands up to 4,000 ft, occasionally higher.

SUBSPECIES IN NEW GUINEA Two:

a) *ruficollis* (Vieillot); northern Moluccas, western Papuan Islands, and western and southern New Guinea (east to head of Geelvink Bay and Noord River); male wing averages 423 mm, bill 193 mm.
b) *jungei* (Mayr); New Guinea east of Mamberamo and Fly Rivers, Japen Island and Fergusson and Goodenough Islands; like *ruficollis* but larger; male wing averages 441 mm, bill 212 mm.

NESTING In a hole in a tree trunk 60 to 100 ft up. The female is sealed in the hole, during incubation at least, apparently with blackened seed-filled pulp of figs, plus bits of rotten wood, and the female is fed by the male through the slit that is left open. [Eggs one to three; white; size 57 × 43 mm; young hatch naked. Indian data.]

REMARKS The hornbill is a fairly common bird in the lowlands, feeding on fruits in the forest treetops and often when moving from place to place flying above the treetops. These birds frequently go in small parties. On one occasion at dusk, on the Oriomo River of south New Guinea, we saw a flight of perhaps a hundred of these birds, passing from east to west just above the treetops as though going to roost. Near Lae, similar movements of flocks of ten to fifty birds following each other along the Markham Valley were seen.

The loud 'whish' 'wissh' of the hornbills' long, broad, slow-moving wings is a conspicuous sound in the forest and can be heard 200 yards away or more. The noise has been likened to that of a steam locomotive starting up. Its call is a horn-like blast 'Hoo ha' or 'Ho' repeated many times but it seems to be given infrequently.

# Order 18 Passeriformes

## Perching birds

*Fifty-four families, twenty-nine in New Guinea*

These birds form the bulk of the smaller birds in the forest and grassland, and the diversity of form and colour often obscure family characters, making diagnosis difficult. It is hoped that the following will be a help in finding the section to which a bird belongs, though it may be necessary to try a species in more than one place before finding its position. The figures cited will help in this.

### Synopsis of Families

1 PITTIDAE Pittas. Three species; length 6–7 in.; ground birds with very short tail and patches of brilliant colour in plumage; no rictal bristles; figure 44a.

2 ALAUDIDAE Larks. One species; length 5 in.; a brown-streaked, walking, free-flying bird of open grasslands; bill rather stout; back of tarsus rounded, unlike the sharp-edged condition in most other perching birds; figure 45c.

3 HIRUNDINIDAE Swallows. Three species; length 5–7 in.; perching birds which feed on insects on the wing; wings very long; legs very short; beak small, gape wide; figure 46.

4 CAMPEPHAGIDAE Cuckoo Shrikes. Fourteen species; length 6–13 in.; tree birds feeding on insects or fruit among the branches of the treetops; bill rather stout, slightly to well hooked; nostrils concealed by bristles; legs rather short; plumage dense; feathers of rump with stiffened shafts except at tip; coloration typically grey, with or without black, but one all black, one with much yellow, some black and white, and a few buff, brown and grey; bold patterns common but some barred; figure 47a, b; plate 3 (figure 1).

5 MOTACILLIDAE Wagtails and Pipits. Four species; length 6–7 in.;

walking birds, that fly freely, found in grasslands (pipits) and stream-sides (wagtails); bill slender; no rictal bristles; figure 45a (pipit), b (wagtail).

6 TURDIDAE Thrushes. Five species; length 5–10 in.; difficult to diagnose as a group; one thrush (*Turdus*), 8–10 in., is a high-mountain bird found on the edge of alpine grassland, blackish with a bright yellow beak and feet; the chat, *Saxicola*, length 5–6 in., is a bird of mid-mountain grass and shrubbery and has a black and white male; three ground-thrushes, 5–9 in., *Oreocincla* and *Amalocichla*, are mostly brownish birds that could be mistaken for babbling thrushes, *Timaliidae*; figure 44b.

7 TIMALIIDAE Babbling Thrushes. Fifteen species; length 4–13 in.; birds found in trees, shrubbery and ground, of various habits and appearance with a moderately stout bill (lengthened and down-curved in two species); rictal bristles absent to small; the short, rounded wing is the most constant character; coloration with much blue, chestnut, brown, olive-green, or black, uniform or with bold patterns. The species most likely to be confused with those of other families are the small brown *Crateroscelis*, which could be confused with the warblers of the genus *Sericornis*; while certain thrushes, *Amalocichla*, may be confused with this family (see above). Figure 48a, b, c, d; figure 49a, b; and plate 3 (figures 5, 7).

8 MALURIDAE Wren Warblers. Five species; length 4–6 in.; wing short and rounded; tail as long as wing or longer, with central tail feathers longest; bill moderate or as long as head and much flattened; rictal bristles few but conspicuous; feet fairly large but slender; pattern bold and simple, without streaks and without green or red. Small birds, often with tail cocked over back, hopping in tall grass, shrubbery or forest undergrowth. Figure 50a, b, c; plate 3 (figure 2).

9 SYLVIIDAE Warblers. Two different groups are involved, which are diagnosed separately:

(a) Grass warblers. Six species; length $3\frac{1}{2}$–10 in.; birds found in grass, reeds or adjacent shrubbery where they hop about; tail short or very long, either rounded or long and graduated; wing rounded or pointed; back either brown and black streaked or plain brown and olive; rictal bristles short or obscure; figure 51a, b.

(b) Tree warblers. Nineteen species; length $3\frac{1}{2}$–5 in.; birds of shrubbery or branches of trees where they glean for insects; wings rounded; bill rather fine; rictal bristles obscure; feet fairly large but fine; tail shorter than wing; a few species with distinct bright patterns (back red; white spots in tail; bright yellow in

underparts; black throat; etc.) but brown, olive-green, yellowish, and buffy white with little patterning is the rule; figure 52a, b.

10 MUSCICAPIDAE Flycatchers. Forty-two species; length 4–8 in.; typically these birds have the bill flattened, wider than high with conspicuous rictal bristles and short tarsus, often not longer than bill; insect-eating birds of shrubbery and trees, sometimes gleaning, sometimes darting after flying insects. Certain species, e.g. *Pachycephalopsis*, can be confused with some species in the next family. Figure 53a, b; figure 54a, b, c; figure 55a, b; figure 56a, b; and figure 57a, b.

11 PACHYCEPHALIDAE Shrike-flycatchers and Whistlers. Twenty-five species; length 5–10 in.; rather stout tree birds with stout bills more or less hooked at tip; rictal bristles moderate or obscure; wing somewhat rounded; coloration of larger species brown (some with black areas) and grey or black; smaller species often with conspicuous yellow; figure 58a, b, c; figure 59a, b.

12 FALCUNCULIDAE Shrike-tit. One species; length $5\frac{1}{2}$ in.; the deep, greatly compressed bill of this insect-eating tree bird is diagnostic; figure 59c.

13 LANIIDAE Shrikes. One species; length 10 in.; bill stout, strongly hooked, with a pronounced 'tooth' just behind the hook; rictal bristles conspicuous; wings short and rounded; tail long and graduated and of slender feathers; a conspicuous bird perching on shrubs in mid-mountain grassland; figure 60a.

14 ARTAMIDAE Wood Swallows. Three species; length 6–8 in.; bill stout, slightly curved, and tapering to a slightly hooked tip; no rictal bristles; legs short; wings long and pointed; tail short; pattern simple, black or grey and white; often on conspicuous tree perches and soaring in sky; figure 60b, c.

15 STURNIDAE Starlings. Seven species; length 7–16 in., the largest including a long tail; bill stout; no rictal bristles; feet rather short and stout; wings pointed; tail short and square to moderate to very elongated and greatly graduated; plumage black (streaked in young) or black and yellow; feed on fruit in treetops; figure 61a, b, c.

16 ORIOLIDAE Orioles. Four species; bill stout; rictal bristles obscure or absent; feet short and rather strong; wings pointed; plumage with streaked underparts or simple patterns of green, grey and black and with eye-wattle; fruit-eating birds of trees; figure 62c.

17 GRALLINIDAE Magpie-larks. One species; length 7–9 in.; bill moderate; no rictal bristles; wings rounded; tail short; a black and white bird of rocks and margins of mountain streams; figure 63b.

18 CRACTICIDAE Bell Magpies and Butcher-birds. Five species; length 11–16 in.; bill rather long, stout and wedge-shaped with a hook at the tip and mostly blue-grey in colour; nostril compressed into a slit; rictal bristles obscure to moderate; plumage boldly black and white or all black; tree birds, but one species feeds on ground; figure 63a.

19 DICRURIDAE Drongos. Two species; length 8–11 in.; bill stout, black; culmen with a ridge and slightly to strongly hooked; nostrils covered with tufts of feathers; rictal bristles long and conspicuous; wings fairly long; feet short and weak; black tree birds with upright pose and fly-catching habits. The small species recalls a large monarch flycatcher. Figure 62a, b.

20 CORVIDAE Crows. Three species; length 18–22 in.; bill stout, more or less arched; nostril covered by feathers; rather long wings and strong feet; tree birds that often come to the ground; colour black or grey; figure 64.

21 PARADISAEIDAE Birds of Paradise. Forty-three species; length 5½–40 in. (larger male has a very long tail); a very diversified family, its members have stout feet and bills (some of the latter long and curved) and fairly long broad wings; in some species males are plain and all black, others are elaborately decorated with plumes and colours. The females may be like the males or in ornamental species much duller, without ornamental plumes; some are barred below; tree birds; some display on ground. Figure 65a, b; figure 66a, b; figure 67a, b; figure 68a, b; plate 4 (figures 1–5); plate 5 (figures 2–7).

22 PTILONORHYNCHIDAE Bowerbirds and Catbirds. Eleven species; length 9–11 in.; bill stout to very stout, sometimes conspicuously hooked and notched; no rictal bristles; wings rather long and broad; feet strong; tail moderate, square to slightly rounded; sexes often alike; only a few species ornamented, with crest or a cape; tree birds, displaying on the ground; figure 69; plate 2 (figure 3); plate 5 (figure 1).

23 NEOSITTIDAE Nuthatches. Two species; length 4–5 in.; bill strongly or slightly upturned; no rictal bristles; tarsus short; toes fairly long with well-curved nails; wings fairly long; tail short; climbing birds of bark of trees; plumage mostly slaty or brown, grey and black with streaked underparts; figure 70b, c.

24 CERTHIIDAE Creepers. One species; length 5–6 in.; bill nearly as long as head, slender, curved and pointed; tarsus short, but toes long with well-curved nails; wings fairly long and broad; tail fairly long, broad and soft at tip; coloration mostly brown; a climbing bird of tree trunks; figure 70a.

25 NECTARINIIDAE Sunbirds. Two species; length 4–5 in.; bill slender, longer than head and well-curved; nostrils imperforate (with a septum between); tongue split into two parts at tip and curled into two tubes for honey-sucking; flower-feeding birds; male olive, yellow and black or all black; female olive and yellow or grey; only to be confused with some small honey-eaters; figure 71a.

26 MELIPHAGIDAE Honey-eaters. Sixty-five species; length $3\frac{1}{2}$–13 in.; bill variable but usually lengthened and curved; nostrils perforate (not separated by a complete septum) and tip of tongue split into four main parts, brush-tipped, and curled into tube for honey-sucking; tree birds often feeding on flowers; eat insects, and some eat fruit; plumage varying but dull colours and plain patterns predominate; figure 72a–d; figure 73a–c; figure 74a, b; and plate 3 (figures 3, 8).

27 DICAEIDAE Flower-peckers. Twelve species; length $3\frac{1}{2}$–$8\frac{1}{2}$ in.; bill usually short, stout and bluntly pointed; tongue flat and notched at tip or tubular and brush-tipped; coloration variable, some dull, some with bold patterns and bright patches of colour; tree birds feeding on fruit; plate 3 (figures 4, 6) and figure 75a–d.

28 ZOSTEROPIDAE White-eyes. Twelve species; length 4–5 in.; bill fairly stout, tapering to a point; no rictal bristles; coloration generally green above and usually with conspicuous white eye-ring; tree birds; figure 71b.

29 PLOCEIDAE Weaver-birds, Weaver-finches, etc. Seventeen species; length $3\frac{1}{2}$–$5\frac{1}{2}$ in.; bill stout and conical for seed eating; flocking birds of grassland, usually with brown, black and white plumage, but two with red; or solitary tree birds of forest with green plumage; figure 76a–e.

## Family Pittidae *Pittas*

(*Twenty-three species, three in New Guinea*)

The pittas form a family of some twenty-three species most of which live in the Malaysian area, with a few species in Africa, and three in New Guinea, two of which are also found in Australia. Pittas are medium sized birds which live singly on the ground in forests where they hop about seeking their food of insects and other small animals. They do fly to perch in a tree to sleep, and also to sing. Their voice includes loud, whistled notes.

The nest is domed and placed on the ground, and the eggs, from two to seven in number, are spotted. The young hatch completely naked. Both parents share nest duties.

The three New Guinea species have patterns which include patches of brilliantly contrasting colours.

**Key to *Pittidae* Species**

Breast pale blue: *Pitta erythrogaster.*
Breast light buffy brown: *P. versicolor.*
Breast with much green: *P. sordida.*

***Pitta erythrogaster* (Temminck)**

Blue-breasted Pitta. Length 6½ in. Adults (colour of head and back varies with the subspecies): top of head fuscous brown (or chestnut), hind neck contrasting brown or red-brown (or chestnut like crown); back blue or green; wings, rump, and upper tail-coverts blue; chin greyish brown; throat black or dusky with white bases of feathers showing through on sides; upper breast pale blue bordered posteriorly by a black line; lower breast to under tail-coverts red; several primaries with a white spot near middle; iris brown; bill black; feet grey. Wing 100 mm, tail 38 mm, culmen 29 mm, tarsus 40 mm.

RANGE From Philippines and Celebes to New Guinea area and Cape York in Australia; lowlands to 2,000 ft.

SUBSPECIES Eight in New Guinea:

a) *macklotii* (Temminck); Misol Island (intergrading with *kuehni*), Salawati, Batanta and Waigeu, and western and southern New Guinea (in north to Geelvink Bay, in south to Port Moresby), also Japen Island, Huon Peninsula and Cape York in Queensland; crown fuscous brown, nape red-brown, and back green.
b) *habenichti* (Finsch); north New Guinea (Geelvink Bay to Astrolabe Bay); like *macklotii* but hind neck paler red-brown.
c) *oblita* (Rothschild and Hartert); upper Aroa River only; like *macklotii* but hind neck pale ochraceous brown and back bluish.
d) *loriae* (Salvadori); south-east New Guinea (west to Kumusi River and Cloudy Bay); top of head and hind neck dark chestnut; back greenish.
e) *aruensis* (Rothschild and Hartert); Aru Islands; like *macklotii* but slightly smaller.
f) *finschii* (Ramsey); D'Entrecasteaux Archipelago (Fergusson and Goodenough Islands); like *loriae* but back bluish.
g) *meeki* (Rothschild); Rossel Island, Louisiade Archipelago; like *macklotii* but head paler, hind neck light brown, throat dusky grey (not black).
h) *kuehni* (Rothschild); Southeast Islands, hybridizing with *macklotii* on Misol Island; blue of breast continues as a band across foreback; some blue in crown.

NESTING A domed nest of dead twigs, leaves, etc., and lined with black fibre, placed on ground (sometimes in low trees or vines?); eggs two, white, with irregular patches of grey-brown; size 28 × 23 mm.

REMARKS This is a fairly common but very secretive bird found on the forest floor. It has been suggested that there is migration between Cape York and New Guinea. Its call is a rasping 'karaa-karra'.

***Pitta versicolour* (Swainson)**

Noisy Pitta. Length 7 in. Adults: top of head brown with a black central streak from forehead; hind neck black joining black of side of head and bordered posteriorly with a narrow tan line; rest of upperparts green with a patch of pale, shining turquoise-blue in the coverts of each wing and the upper tail-coverts; underparts: chin and throat black; rest of underparts light tan-brown with a black patch in centre of lower breast and a pale red one in centre of abdomen to under tail-coverts; several primaries with a white spot near middle; iris brown; bill black; feet pinkish. Wing 118 mm, tail 45 mm, culmen 30 mm, tarsus 42 mm.

RANGE Eastern Australia to south New Guinea.

SUBSPECIES IN NEW GUINEA One, *simillima* (Gould).

NESTING [A dome-shaped structure of twigs and leaves on the ground; eggs three to five, creamy white spotted with brown; size 33 × 24·5 mm. Australian data.]

REMARKS The noisy pitta has been said to nest in the Cape York area from November or December to March, and to migrate to New Guinea for the non-breeding season. The fact that the species has been collected only three times in New Guinea, each time in the Fly River area (Daru Island, June or July; Katau River, October and November), may be a reflection of the small amount of intensive bird work done there.

***Pitta sordida* (Müller)**

Black-headed Pitta. Length 6½ in. Adults: head and neck all round black; rest of upperparts dark green with a patch of pale shining turquoise in the upper wing-coverts of each wing, and some of upper tail-coverts shining blue-green; underparts with or without a glittering band of pale green just behind black throat; breast mostly green; flanks blue-green or blue; a patch on lower breast black (sometimes absent) more or less edged blue; abdomen and under tail-coverts red; white spots in middle of some primaries present or absent; iris brown; bill black; feet grey or pink. Wing 104 mm, tail 35 mm, culmen 25 mm, tarsus 37 mm.

RANGE Southern Asia through the Malayan Islands to New Guinea area; in New Guinea in lowlands up to 2,300 ft.

SUBSPECIES IN NEW GUINEA Five:

a) *novaeguineae* (Müller and Schlegel); western Papuan Islands, all

New Guinea and Long Island; with glittering breast band and greenish blue flanks.

b) *hebetior* (Hartert); Dampier (Karkar) Island; like *novaeguineae* but darker.

c) *goodfellowi* (White); Aru Islands; like *novaeguineae* but slightly smaller and darker.

d) *mefoorana* (Schlegel); Numfor Island, Geelvink Bay; intermediate between *novaeguineae* and *rosenbergii*.

e) *rosenbergii* (Schlegel); Biak Island, Geelvink Bay; like *novaeguineae* but lacks the glittering breast band; has flanks pure ultramarine-blue (not bluish green), lacks black in lower breast.

NESTING Nest: a domed structure on the ground in second-growth forest, where it was well concealed by a dead branch, grass and herbs; base of nest largely dead leaves with some dead sticks; walls and roof of dead plant fibres and rootlets. The lining in the bottom of the nest was of finer vegetable fibre. Eggs three or four, white with grey to red-brown spots; size 26·4 × 24·4 mm.

REMARKS The usual shyness of the pitta in its shady haunts makes field observation difficult. The song has been described as three loud whistled notes.

## Family Alaudidae *Larks*

*(Seventy-five species, one in New Guinea)*

Larks form a family of nearly world-wide distribution, but with most of the seventy-five species in Africa and Eurasia. One species occurs in New Guinea and Australia.

Larks are birds of barren open country and grasslands where they walk about and feed on insects and seeds. Though cryptically coloured they usually fly instead of running and hiding, to escape enemies. Some species may perch on trees. Some have notable songs given on the wing. The nest is placed on the ground and may sometimes be domed; the eggs are speckled, the young have rather dense down on the upperparts, and the male helps in the care of the young.

### *Mirafra javanica* (Horsfield)

Bush Lark. Length 5 in. Adults: upperparts dark brown, many of the feathers with pale brown or grey edging giving a streaked appearance; chin white, rest of underparts pale greyish buff with a band of dark brown spotting across the upper breast; outer and inner margins of remiges rufous; outer tail feathers white, next pair with outer web white; bill black, mandible pale horn-colour; feet horn-colour. Wing 71 mm, tail 45–50 mm, culmen 15 mm, tarsus 22 mm.

RANGE Southern Asia to Australia; in New Guinea at sea level and 2,500 ft in grass country.

SUBSPECIES IN NEW GUINEA Two named:

a) *aliena* (Greenway); upper Watut River, Morobe district, north-eastern New Guinea; upperparts generally dark brown.
b) *sepikiana* (Mayr); Marienberg, Sepik River; upperparts generally blackish.
c) A single specimen from Merauke, south New Guinea, suggests a third, brownish, smaller (wing 67 mm) subspecies may exist there.

NESTING [A cup-shaped structure of grass on ground among grass in open; eggs three to four, greyish white with fine spotting of olive and grey, especially on larger end. Australian data.]

REMARKS Many collectors searching extensive areas of grasslands have not found this lark, which suggests that its occurrence in New Guinea is really very local. So far the species has been found only at three widely separated localities.

## Family Hirundinidae *Swallows*

*(Seventy-five species, three in New Guinea)*

Swallows form a fairly large family of some seventy-five species and the group is almost cosmopolitan in distribution. These birds are nearly as aerial as swifts, which they somewhat resemble in shape and feeding habits. They fly about in easy graceful flight catching their usual food of small insects on the wing. However, swallows perch freely on exposed branches, something only the crested swifts do. Swallows are sometimes solitary, but more often they are gregarious, in feeding, roosting and nesting. The nest varies with the species. It may be in a burrow, or in a crevice or hole in rocks, trees or buildings, or made of mud, or retort-shaped. The eggs are white, plain or spotted, and the male shares in, at least, some nest duties. The young have scant down on the upperparts.

Three swallows occur in New Guinea; one a migrant from Asia, one from Australia, and one is a breeding bird.

### Key to *Hirundinidae* Species

1 Rump whitish, contrasting with back: *Hirundo nigricans.*
Rump dark, like back: 2.
2 Chin and throat rufous brown: *H. tahitica.*
Chin and throat rufous, edged posteriorly with an incomplete black band: *H. rustica.*

***Hirundo rustica* (Linnaeus)**

European Swallow. Length 6½ in. Adults: forehead rufous, rest of upperparts glossy bluish purple; chin and throat rufous, with a more or less interrupted black band separating them from the white or pinkish white of the rest of underparts; tail very deeply forked, the outer rectrices with a white mark in the distal half. Young are similar but duller and with a much shorter, less deeply forked tail. Wing 120 mm, tail 85 mm with fork 35 mm deep, culmen 13 mm, tarsus 11 mm.

RANGE Temperate regions of northern hemisphere, migrating south in winter to the tropics and even southward.

SUBSPECIES IN NEW GUINEA One, *gutturalis* (Scopoli); a winter visitor from eastern Asia.

REMARKS This swallow appears to be a rather uncommon migrant to western New Guinea.

***Hirundo tahitica* (Gmelin)**

Pacific Swallow. Length 5 in. Adults: forehead rufous brown; rest of upperparts glossy bluish black; chin and throat rufous brown; rest of underparts dull greyish brown; iris dark brown; bill and feet black. Male wing 110 mm, tail 50 mm, culmen 13 mm, tarsus 10 mm. Female wing 107 mm; fork of tail shallow, 10 mm deep.

RANGE Southern India to islands of Polynesia; in New Guinea and satellite islands, a common species found in open country near coast, especially near human habitation; rarely to 2,000 ft, occasionally to 6,500 ft.

SUBSPECIES IN NEW GUINEA One, *frontalis* (Quoy and Gaimard).

NESTING Nest built on a cornice of a frame building [or on rocks, or broken trunks of trees leaning over water; a shallow saucer of mud, lined with fine roots and feathers; eggs three or four, white spotted with red-brown and grey; size 17 × 12 mm. Indian data.]

REMARKS The Pacific swallow was common about the towns of Lae, Wewak and Port Moresby, perching on telephone wires and buildings and feeding over the streets, gardens and the waterfront. On the upper Fly River where the broad stream flowed through continuous forests the species was occasionally seen feeding over the river; it was also occasionally seen feeding over broad lowland swamps in south-east New Guinea. In the mid-mountain, grassy valleys of south-east New Guinea, where there was a line of mission stations, this swallow was common about most of them and we were told that before the white man came, these swallows were unknown to the natives. However, in the mid-mountain grassland of the Snow Mountain region where there was a

dense native population but where no white man had ever lived, the species was fairly common, perching in dead trees and feeding over the grasslands. Evidently the species needs open places to feed, and where white settlement occurs and frame buildings are erected, the birds are quick to adapt to them.

The Australian welcome swallow, *Hirundo neoxena*, is a very close relative.

***Hirundo nigricans* (Vieillot)**

Tree Martin. (sometimes put in the genus *Petrochelidon* or *Hylochelidon*). Length 5¼ in. Adults: upperparts glossy black except for grey-brown forehead and pale, greyish white rump and upper tail-coverts; throat and breast grey; abdomen white; flanks more or less tinged brown; fork of tail shallow, about 8 mm deep; iris brown; bill black; feet blackish brown. Wing 110 mm, tail 50 mm, culmen 10 mm, tarsus 10 mm.

RANGE Tasmania and Australia to New Guinea (as a migrant), Solomon Islands (as a migrant), Lesser Sunda Islands and Moluccas; in New Guinea widespread in lowlands.

SUBSPECIES IN NEW GUINEA One, *nigricans* (Vieillot).

NESTING [In a hole in a tree or crevice of building; the size of the entrance hole may be decreased with mud; the hollow is lined with dry leaves or feathers; eggs four, white spotted and blotched with brown and grey, especially around larger end; size 18 × 13 mm. Australian data.]

REMARKS Though the tree martin has been recorded from many lowland localities in New Guinea and we found it in the months of March, April, August, September and November, it seemed to be common only in August and September when it was seen in numbers over the lagoons and big marshes of the middle Fly River. The birds fed over the water and marsh and roosted nearby in flocks of hundreds in the bamboos and savannah trees. As the breeding season in Australia is said to be August to February, there is the possibility of some nesting in south New Guinea at least.

## Family Campephagidae *Cuckoo-shrike*

*(Seventy species, fifteen in New Guinea)*

This family of about seventy species is found in Africa, and southern Asia to Australia and south Pacific island area. New Guinea has fifteen species. These birds usually gather in small parties in the tops of trees where, with slow movements they look about on the branches and

leaves for insects, or else feed on the tree fruits. These birds often give characteristic calls as they fly. The nest, so far as is known, is a shallow saucer of twigs, etc., often bound together with cobweb, decorated with pieces of lichen and placed in a fork or on a branch of a tree. The eggs are whitish, greenish or bluish blotched with brown. Both sexes share nest duties. The young may be barred white and dusky.

The New Guinea species are grouped into three genera recognizable as follows:

a) CAMPOCHAERA One species; length 8 in.; a New Guinea endemic; plumage with much yellow and black in bold pattern; in lowlands only.

b) LALAGE Three species; length 6–7½ in.; males with conspicuously black and white plumage in bold patterns; females duller, sometimes barred below; one washed buffy below.

c) CORACINA (*Edolisoma* is included) Ten species; length 8–13 in.; males usually with grey and black boldly patterned plumage (one all black); females like males or with less black, or different, brownish to rufous, sometimes barred below.

***Campochaera sloetii* (Schlegel)**

Orange Cuckoo-shrike. Length 8 in. Adult male: forehead and line over eye greyish white; crown grey to olive; hind neck to upper tail-coverts orange-yellow washed with greenish on mantle; wing black with two white stripes, one formed by the white edgings of greater wing-coverts, the other by white edgings on the distal half of the secondaries; tail, which is much graduated, black, with outer pairs of rectrices with conspicuous white tips; throat to level of eye and upper breast black; lower breast to under tail-coverts vivid orange-yellow; iris brown; bill and feet black; wing 104 mm, tail 85 mm, culmen 15 mm, tarsus 20 mm. Female: like male but duller yellow, crown more greenish, and throat and upper breast grey, not black.

RANGE New Guinea, east in the north to Idenburg River, in the south to Astrolabe Mountains; lowlands up to 2,500 ft.

SUBSPECIES Two:

a) *sloetii* (Schlegel); Arfak and north New Guinea (Idenburg River and near Hollandia).

b) *flaviceps* (Salvadori); south New Guinea (Mimika River to Astrolabe Mountains); like *sloetii* but crown more greenish.

REMARKS The orange and black cuckoo-shrike is not uncommon locally, but it always stays in the tops of the forest trees. There, it formed small parties of three to six birds; they gave pleasant trills and whistled notes, sometimes in chorus, which attracted attention to them, but they

stayed only a short time in one tree before moving on to another so they were difficult to find, and when found, difficult to watch. The birds seen seemed to be looking for insects among the twigs and branches, but an examination of stomach contents showed only a diet of fruit. However, Claude Grant reported that the birds darted out like flycatchers to catch insects on the wing.

### Key to *Lalage* Species (Adult Males)

1 Abdomen more or less ochraceous; white line over eye: *L. leucomela.*
No ochraceous on abdomen; no white line over eye: 2.
2 Rump and upper tail-coverts grey: *L. sueurii.*
Rump feathers black with white tips: *L. atrovirens.*

### *Lalage atrovirens* (Gray)

Black-browed Triller. Length 7–7½ in. Adult male: upperparts black glossed with blue-green except for conspicuous white tips to rump feathers; wings black with conspicuous white tips to median coverts, smaller white tips to inner greater coverts, and conspicuous white edgings to inner secondaries; tail, slightly rounded, black, with white terminal tips to outer pairs of rectrices; side of head black; underparts pure white; iris brown; bill and feet black; wing 98 mm, tail 78 mm, culmen 17 mm, tarsus 20 mm. Female: like adult male but back duller black, and breast and flanks finely barred with black; wing 96 mm.

RANGE Tanimbar Islands and northern and western New Guinea, and some western islands; lowlands, but occasionally to 3,800 ft.

SUBSPECIES IN NEW GUINEA Two:

a) *atrovirens* (Gray); western Papuan Islands (Misol, Salawati, Waigeu), and north New Guinea, east to Astrolabe Bay and Ramu River.
b) *leucoptera* (Schlegel); Biak Island in Geelvink Bay; like *atrovirens* but with more white in wing.

REMARKS This triller has usually been recorded as going about in small parties in the tops of low trees on the forest edge, and as a fruit eater.

### *Lalage sueurii* (Vieillot)

Australian Triller. Length 6½ in. Adult male in breeding dress: upperparts glossy black with rump and upper tail-coverts grey; wings black with median and most of lesser wing-coverts white, greater wing-coverts narrowly edged and tipped with white; secondaries edged with white; tail black, outer pair of rectrices broadly tipped with white; underparts white; male in non-breeding plumage differs in having head and mantle brown as in female. Female is browner, with white in

wing reduced and washed brown, and rump washed brown; white underparts duller and with obscure barring on sides of breast. Iris brown; bill black; feet black. Wing 90 mm, tail 72 mm, culmen 17 mm, tarsus 20 mm.

RANGE Java to Lesser Sunda Islands, and Celebes area, also drier parts of Australia and an off-season migrant to north Australia and New Guinea.

SUBSPECIES IN NEW GUINEA One, *tricolor* (Swainson), recorded only a few times; Port Moresby district and Bartle Bay.

REMARKS This species was found in open savannah country near Port Moresby.

***Lalage leucomela* (Vieillot)**

White-browed Triller. Length 7 in. Adult male: upperparts glossy black, except for grey tips to feathers of rump and upper tail-coverts; wing black, except for conspicuous white tips to median wing-coverts, smaller white tips to greater coverts, and conspicuous white edgings to secondaries; tail black, the outer pairs of rectrices with broad white edges; side of head with a white line from lores, over eye to side of nape, and a black line through eye; underparts: throat white, breast and flanks grey, with or without ochraceous wash, barred with black (variable); abdomen ochraceous (variable in extent and intensity); iris brown; bill black; feet black; wing 96–102 mm, tail 82 mm, culmen 20 mm, tarsus 23 mm. Female: similar but duller, more dusky grey above, and more ochraceous tinged and more heavily barred below.

RANGE Eastern and northern Australia, Kei Islands, Aru Islands, eastern and southern New Guinea and eastern islands, and Bismarck Archipelago; lowlands up to 4,000 ft.

SUBSPECIES IN NEW GUINEA Four:

a) *polygrammica* (Gray); Aru Islands and southern and eastern New Guinea (west in south to Mimika River and in north to Watut River (Wau) ); underparts grey, with ochraceous restricted to abdomen and under tail-coverts.
b) *obscurior* (Rothschild and Hartert); D'Entrecasteaux Archipelago; like *polygrammica* but ochraceous extending over breast.
c) *trobriandi* (Mayr); Trobriand Islands; like *polygrammica* but with ochraceous of underparts reduced and pale tips of rump feathers narrower.
d) *pallescens* (Rothschild and Hartert); Misima (St. Aignan) and Tagula (Sudest) Islands, Louisiade Archipelago; like *trobriandi* but underparts paler.

NESTING [A shallow, saucer-like structure of twigs and rootlets placed in a branch of a tree. A single egg, greenish blotched with red-brown; size 24 × 13·5 mm. Australian data.]

REMARKS This triller was fairly common in denser savannah, rain forest, second growth and mangroves. It was usually found alone or in pairs. Sometimes the birds were in the treetops, moving about in the foliage or sitting quietly on exposed dead branches. This species fed on both fruit and insects, the former being the more common.

**Key to *Coracina* Species (Greybirds)**

(The genus *Edolisoma* is included)

1 Size large, length 12 in. or more: 2.
Size small, length less than 11 in.: 4.
2 Secondaries with wide grey edgings like back: 3.
Secondaries black without grey edgings: *C. longicauda.*
3 Body plumage pale grey with abdomen white: *C. novaehollandia.*
Body plumage including abdomen dark blue-grey: *C. caeruleogrisea.*
4 Plumage all black: *C. melaena* (male).
Underparts all black, back grey: *C. montana* (male).
Underparts mostly grey or rufous or buffy white (with or without barring): 5.
5 Back blue-grey: 6.
Back brownish grey, wing-coverts edged fawn, outer tail feathers black at base: *C. tenuirostris* (female).
Back cinnamon-brown, wing-coverts and secondaries with broad rufous edges, outer tail feathers black at base: *C. schisticeps* (female).
Back cinnamon-rufous, outer tail feathers rufous to base: *C. melaena* (female).
6 Eye yellow, under wing-coverts barred black and white: *C. lineata.*
Eye brown, under wing-coverts plain rufous: *C. boyeri.*
Eye brown, under wing-coverts plain grey or white: 7.
7 Abdomen white: *C. papuensis.*
Abdomen grey, like breast: 8.
8 Central tail feathers all black: *C. montana* (female).
Central tail feathers mostly grey like back: 9.
9 Secondaries edged with grey like back: 10.
Secondaries edged with pale greyish white: *C. tenuirostris* (male).
10 Wing-coverts with outer web all grey: *C. schisticeps* (male).
Wing-coverts with outer web only broadly edged grey: *C. morio.*

**Coracina melaena (Lesson)**

also known as *Edolisoma melan*

Black Greybird. Length 9 in. Adults: male, entirely glossy black; female, generally reddish brown (underparts paler cinnamon in some races,

with or without barring on sides), tail feathers rufous to base. Iris brown; bill and feet black. Wing 125 mm, tail 100 mm, culmen 25 mm, tarsus 23 mm.

RANGE New Guinea and some of its satellite islands; lowlands up to 2,500 ft, and occasionally 4,000 ft.

SUBSPECIES Six:

a) *melaena* (Lesson); Batanta and Salawati Islands and western New Guinea (east in the north to Astrolabe Bay and Ramu River, and in the south to Eilanden River); male with purplish gloss and female reddish brown, without barring.
b) *waigeuense* (Stresemann and Paludan); Waigeu Island; like *melaena* but female with underparts deep tawny and some black barring on sides.
c) *batantae* (Gyldenstolpe and Mayr); western Papuan island of Batanta; like *waigeuense* but female without barring (needs confirmation).
d) *tommasonis* (Rothschild and Hartert); Japen Island, Geelvink Bay; like *melaena* but female brighter red-brown.
e) *meeki* (Rothschild and Hartert); eastern New Guinea (west in north to Huon Gulf, in south to Fly River); like *melaena* but female with much paler upperparts and much paler, more cinnamon underparts.
f) *goodsoni* (Mathews); Aru Islands; like *melaena* but male with steel-green, not purplish gloss, and female darker.

REMARKS The black greybird is a fairly common species in the tree-tops and substage of the forest where it is often among the big mixed bird parties.

### *Coracina schisticeps* (Gray)

Gray's Greybird. Length 8½ in. Adult male: upperparts slaty grey, wing-coverts with outer webs entirely grey; remiges black, the secondaries edged with grey the colour of the back; central tail feathers grey with a black subterminal mark and rest of rectrices black tipped with grey, more broadly on the outermost ones; sides of head darker grey with the area from eye to nostril black; chin blackish, rest of underparts grey, under wing-coverts and axillaries plain grey; iris brown; bill and feet black; wing 116 mm, tail 86 mm, culmen 17 mm, tarsus 21 mm. Female: crown and nape grey or (in a subspecies) rufous brown; rest of upperparts rufous brown, central tail feathers the same with sub-terminal blackish wash; other rectrices black, tipped rufous, more broadly on outer ones; lores blackish; underparts rufous brown (barred blackish in one subspecies); under wing-coverts plain rufous.

RANGE Misol Island, New Guinea and D'Entrecasteaux Archipelago; lowlands up to 4,000 ft.

SUBSPECIES Four:

a) *schisticeps* (Gray); Misol Island and north-west New Guinea (east in the north to head of Geelvink Bay, in the south to Triton Bay); female with grey crown and rufous ear-coverts and chin.
b) *reichenowi* (Neumann) (*moszkowskii* is not separable); north New Guinea (Mamberamo to Sepik Rivers); like *schisticeps* but male with chin more blackish and female with crown rufous like back.
c) *poliopsa* (Sharpe); southern New Guinea (Kapare River east to Astrolabe Mountains); like *schisticeps* but female with slate-grey (not rust-brown) ear-coverts and chin.
d) *vittata* (Rothschild and Hartert); D'Entrecasteaux Archipelago; like *schisticeps* but female has the underparts barred with black, except on lower abdomen; the chin and ear-coverts are grey.

REMARKS This is a fairly common species, frequenting the upper parts of forest trees and feeding largely on fruit.

### *Coracina tenuirostris* (Jardine)

Long-billed Greybird. Length 10 in. Adult male: upperparts blue-grey; remiges black, primaries narrowly, secondaries more broadly margined with grey; central tail feathers grey with a black mark near tip; outer rectrices black tipped with grey, more broadly on the outermost; area from eye to nostril black; below eye to ear-coverts blackish; underparts blue-grey, darkest on throat (where sometimes black to breast), palest on abdomen; under wing-coverts plain grey; iris dark brown; bill black; feet black. Wing 120–30 mm, tail 100 mm, culmen 27–34 mm, tarsus 23 mm. Female: upperparts greyish brown or greyish olive, more ashy on crown, and feathers of rump and upper tail-coverts edged with fulvous; middle and greater wing-coverts and remiges blackish brown edged with fulvous, more greyish on inner secondaries, more rufous on primaries; lores with a black spot; ear-coverts fuscous streaked with white; throat buffy with fine black bars; breast and abdomen buffy white to ochraceous or rust barred with black (barring reduced to obsolete in some races); under tail-coverts buffy white, plain; under wing-coverts plain buffy; central tail feathers light greyish brown, others fuscous tipped with buffy white, most broadly on outer ones which also have pale outer web.

RANGE Timor and Celebes to Australia, New Guinea, Solomon Islands, and some islands in Micronesia; in New Guinea, a lowland species, up to 2,500 ft.

SUBSPECIES IN NEW GUINEA Seven:

a) *mullerii* (Salvadori); Kofiau, Misol and Salawati Islands, also New Guinea (except the south), D'Entrecasteaux Archipelago and Woodlark Island; wing 130 mm.

b) *aruensis* (Sharpe); Aru Islands and south New Guinea (Mimika River to Fly River); like *mullerii* but smaller; wing 120 mm.

c) *nehrkorni* (Salvadori); Waigeu Island; like *mullerii* but male with ear-coverts and throat black.

d) *numforana* (Mayr) (also known as *neglectum*); Numfor Island; like *mullerii* but female with barring on underparts much reduced or absent.

e) *meyerii* (Salvadori); Biak Island; like *mullerii* but male with grey darker and chin to breast black; female with underparts more intensely buffy or even rust-coloured; barring on underparts much reduced.

f) *rostrata* (Hartert); Rossel Island, Louisiade Archipelago; like *mullerii* but bill very much larger and sharply hooked (culmen 34 mm); female with sides of neck and breast more or less barred with black.

g) *tagulana* (Hartert); Tagula and Misima Islands, Louisiade Archipelago; like *aruensis* but with a larger bill.

NESTING [A small, shallow cup of twigs and spider web and decorated on outside with lichen, on a branch of a tree; a single egg, greenish or bluish blotched all over with brown; size 31 × 20 mm. Australian data.]

REMARKS This species seemed most common on the forest edge, in savannah country and in second growth and mangrove swamps. Unlike most greybirds, insects rather than fruit seemed the usual diet.

***Coracina morio* (Müller)**

Müller's Greybird. Length 8½ in. Adult male: upperparts blue-grey; wing-coverts black with only broad edges of grey; remiges black, the primaries narrowly, the secondaries broadly edged with grey; central tail feathers grey, the lateral ones black tipped with grey which is broader on the outer ones, and the outermost also has the outer web grey; area eye to bill black; ear-coverts blackish; chin and throat blackish, rest of underparts grey; under wing-coverts ashy grey; iris brown; bill black; feet black; wing 115 mm, tail 85 mm, culmen 16 mm, tarsus 21 mm. Female: like male but somewhat paler and less bluish; chin and throat grey like rest of underparts; ear-coverts much greyer and feathers of lores tipped blue-grey; wing 110 mm. Immatures: barred below.

RANGE Philippines and Celebes to New Guinea; in New Guinea,

Misol, Waigeu, Japen, Meos Num Islands and mid-mountains of New Guinea, from 1,600 to 5,800 ft.

SUBSPECIES IN NEW GUINEA One, *incerta* (Meyer).

REMARKS This species has some puzzling variations in plumage and bill size, whose meaning needs clarification.

### *Coracina montana* (Meyer)

Black-bellied Greybird. Length 9½ in. Adult male: upperparts generally blue-grey, remiges deep glossy black, inner ones narrowly edged with grey, rectrices glossy black; lores, side of head, throat and rest of underparts glossy black; iris brown; bill and feet blackish; wing 137 (126–40) mm, tail 112 mm, culmen 24 mm, tarsus 25 mm. Female: upperparts like male but underparts grey except for black area of throat to lores; under wing-coverts plain grey.

RANGE New Guinea mountains from 2,500 to 9,000 ft.

SUBSPECIES None: *minus* is not recognized.

REMARKS This species is fairly common in the upper part of the forest trees. It moved about there in pairs or small parties and was noisy and consequently conspicuous but it was continually moving and so was difficult to watch. Like most of its relatives, its main diet seems to be fruits.

### *Coracina lineata* (Swainson)

Barred Greybird or Yellow-eyed Greybird. Length 9 in. Adult male: upperparts blue-grey; lores to nostril black; remiges black, inner ones broadly, outer ones narrowly edged grey; rectrices black, more or less edged grey basally; underparts grey (breast and abdomen barred with white, or black and white in some races); under wing-coverts and axillaries barred black and white; iris yellow; bill black; feet blackish; wing 138 mm, tail 105 mm, culmen 24 mm, tarsus 25 mm. Female: with breast to under tail-coverts barred black and white.

RANGE Eastern Australia, Waigeu Island, mountains of New Guinea 2,000 to 4,000 ft; Bismarck and Solomon Island Archipelagoes.

SUBSPECIES IN NEW GUINEA Three:

a) *axillaris* (Salvadori); Waigeu and mountains of New Guinea; male with underparts plain grey.
b) *maforensis* (Meyer); Numfor Island, Geelvink Bay; like *axillaris* but male with breast with fine white bars.
c) *lineata* (Swainson); eastern Australia; one record south New Guinea (Merauke); like *maforensis* but male with distinct black and white barring on breast.

NESTING [Shallow neat saucer of twigs, etc., and cobweb; placed in tree; eggs two, white spotted with brown; size 30 × 22 mm. Australian data.]

REMARKS The yellow-eyed greybird was found at only a few places, but it was common locally. It was usually found in parties of three to five birds flying over the second growth or perched in tall trees at the forest edge of the mid-mountain grasslands. The birds sometimes moved among the smaller branches, with deliberate actions, searching for insects. More often they came to fig trees, where along with birds of paradise and fruit pigeons, they swallowed the fruit whole. The birds were restless and did not stay long at each visit, but kept moving from tree to tree, often uttering a plaintive, whistled 'whee'.

### *Coracina boyeri* (Gray)

Rufous-underwing Greybird. Length 8½ in. Adult male: generally blue-grey, paler on crown, but under wing-coverts and axillaries rufous, area eye to nostril black, and chin and upper throat dull black; remiges black, inner ones broadly edged grey; rectrices black except central ones which are grey; iris dark brown; bill black; feet black; wing 135 mm, tail 93 mm, culmen 22 mm, tarsus 20 mm. Adult female: like male, but with no black in face or throat and with lores white or grey.

RANGE New Guinea lowlands, also Misol and Japen Islands.

SUBSPECIES Two:

a) *boyeri* (Gray); Misol and Japen Islands and western and northern New Guinea (east in north to Kumusi River, and in south to Triton Bay); under wing-coverts rich rufous; female with white lores.
b) *subalaris* (Sharpe); southern New Guinea (Mimika River to Milne Bay); under wing-coverts pale rufous; female with grey lores.

REMARKS This greybird seems to be a bird of the forest treetops, often seen in parties of three or four birds. The bird seems to eat more fruit, such as figs, than it does insects.

### *Coracina caeruleogrisea* (Gray)

Stout-billed Greybird. Length 13 in. Adult male: grey-blue with area eye to nostril black; remiges black, secondaries broadly edged with blue-grey; central rectrices like back, lateral ones fuscous; under wing-coverts and axillaries plain rusty buff; iris dark brown; bill and feet black; wing 162–90 mm, tail 153 mm, culmen 31–35 mm, tarsus 28 mm. Female: similar but without black on head; wing 161–8 mm. Immatures may have patches of white plumage (nestling) on body and head.

This species shows considerable increase in size with increase in

altitude in Snow Mountain area, as follows: male wing, sea level 162 mm; 7,000 ft, 172 mm.

RANGE New Guinea and Japen and Aru Islands; lowlands up to 7,000 ft.

SUBSPECIES Three:

a) *strenua* (Schlegel); Japen Island and mountains of New Guinea, east to Central Highlands; male wing 167 mm, female wing 161 mm.
b) *adamsoni* (Mayr and Rand); eastern New Guinea, west to Astrolabe Bay and Hall Sound areas; like *strenua* but grey paler; darker ochraceous under wing-coverts and axillaries; long wing and larger bill; male wing 178 mm, female wing 168 mm.
c) *caeruleogrisea* (Gray); Aru Islands and south New Guinea (Fly River); small like *strenua* (male wing 168 mm), but general colour pale and under wing-coverts paler.

REMARKS The stout-billed greybird was fairly common, not only in heavy forest but also in secondary bushland and in patches of forest; its loud, harsh cries made it conspicuous. It fed through the upper parts of the trees, slowly looking about for its prey which consisted of a variety of large insects.

***Coracina novaehollandiae* (Gmelin)**

Australian Greybird. Length 13 in. Adult male: upperparts generally pale dove-grey with forehead broadly black; remiges black with primaries with very narrow and secondaries very broad grey edging; central rectrices grey, black towards the end and narrowly tipped with white; outer rectrices black, tipped with white, more broadly on the outermost; forehead, side of head and neck, and chin and throat black, changing to dark grey on breast which pales to white on abdomen and under tail-coverts; under wing-coverts and axillaries white; iris brown; bill and feet black; wing 180–200 mm, tail 145 mm, culmen 30 mm, tarsus 30 mm. Female: like male, but black of head somewhat reduced in extent.

RANGE From Himalaya Mountains to Australia and Tasmania; Australian and Tasmanian birds migrate northward reaching New Guinea and Solomon Islands.

SUBSPECIES IN NEW GUINEA Three similar ones reach New Guinea in the off-season migration:

a) *didimus* (Mathews); of northern Australia to western New Guinea and Lesser Sunda Islands.
b) *melanops* (Latham); of southern Australia to eastern New Guinea and the Solomon Islands.

c) *novaehollandiae* (Gmelin); of Tasmania has reached the Port Moresby region of New Guinea.

REMARKS Our extreme dates for this Australian migrant are 17 May and 13 October.

### *Coracina papuensis* (Gmelin)

Papuan Greybird. Length 10 in. Adults: forehead black, rest of upperparts blue-grey; remiges black, secondaries broadly edged with grey, primaries narrowly edged with grey or white; central rectrices grey, outer ones black tipped with grey; side of face from eye to nostril and across forehead black; underparts grey paling to white on abdomen and under tail-coverts (sometimes throat white); under wing-coverts and axillaries white; iris brown; bill black; feet black. Wing 145–50 mm, tail 105 mm, culmen 30 mm, tarsus 25 mm.

RANGE Moluccas to New Guinea, northern Australia, and Solomon Islands.

SUBSPECIES IN NEW GUINEA Seven:

a) *melanolora* (Gray); Moluccas to Misol Island; underside grey, only abdomen and under tail-coverts white; primaries edged with grey.
b) *papuensis* (Gmelin); Salawati, Batanta, Japen and west and north New Guinea (east in north to Huon Gulf, in south to Etna Bay); like *melanolora* but slightly smaller.
c) *angustifrons* (Sharpe); south-eastern New Guinea (west in north to Huon Gulf, on south to Hall Sound); like *papuensis* but much paler and with primaries edged with white.
d) *intermedia* (Rothschild); southern New Guinea from Mimika to Noord River; intermediate between *papuensis* and *angustifrons*.
e) *oriomo* (Rand and Mayr); south New Guinea (Oriomo River to Merauke area); differs from all the above in the restricted amount of black in the face, which barely reaches the midline of the forehead.
f) *hypoleuca* (Gould); north-western Australia and Aru Islands; like *oriomo* but paler and slightly larger.
g) *louisiadensis* (Hartert); Tagula (Sudest) Island, Louisiades Archipelago; like *hypoleuca* but wing shorter and bill longer.

NESTING [A shallow saucer of twigs and cobweb in a tree; eggs two, bluish green blotched with brown and purplish; size 27·5 × 20 mm. Australian data.]

REMARKS This greybird is a common species of the savannah, mangrove swamp and second growth, and along the edge of the forest by the lowland rivers where it is often seen in small parties. It lives in the tops of the trees where it moves about slowly, looking for its food of larger

insects. It also fly-catches, flying out and snapping up insects in flight, and one was seen to follow a fluttering insect to the ground. The 'wit-chit' call is the commonest, but sometimes a series of soft calls is given. A pair of birds was seen to mate on a branch after a short period of mutual display, consisting of facing each other and fluttering their wings.

***Coracina longicauda* (De Vis)**

Black-hooded Greybird. Length 13 in. Adult male: head and neck glossy black as are remiges and rectrices; back, wing-coverts and upper tail-coverts grey; breast and abdomen somewhat paler grey; under wing-coverts and under tail-coverts darker grey than back; iris brown; bill black; feet black; wing 170–82 mm, tail 170 mm, culmen 33 mm, tarsus 33 mm. Female: like male but crown and hind neck grey, and size slightly smaller.

RANGE Mountains of eastern and central New Guinea; 6,000 to 12,000 ft.

SUBSPECIES Two:

a) *longicauda* (De Vis); mountains of Central Highlands to south-eastern New Guinea; male wing 182 mm.
b) *grisea* (Junge); Snow Mountains; like *longicauda* but smaller; male wing 170 mm.

NESTING Nest in a fork fifty to sixty feet up in a forest tree; saucer-shaped, of fine rootlets with a foundation of moss and decorated on the outside near the top with lichen (and spider webs?), and on the inside a few green leaves; a single, pale bluish egg mottled and spotted with brown. The young bird is fed by both parents who bring it insects and lizards. In a three hour and twenty-seven minute period between 8.25 a.m. and 12.07 p.m., at one nest, the male fed the young six times and the female five times. On three occasions, both came to the nest at the same time (Shaw-Meyer).

REMARKS In its restricted habitat, the tall dense mountain forest, this bird may be common. Usually in small parties, the birds search the smaller branches of the treetops for insects, lizards. They may also eat frogs. Only a little fruit is eaten. Most of the calls of this bird were loud, sharp, and often heard. The commonest was a 'ker kee'.

## Family Motacillidae *Pipits and Wagtails*

*(Forty-eight species, four in New Guinea)*

This is a family of almost world-wide distribution and composed of

about forty-eight species. The birds spend much of their time walking about on the ground seeking their food of insects and other small invertebrate animals, a diet varied with seeds in some species. The up-and-down tail wagging which has given the family its name is pronounced in some species. Though these are ground birds, they do not skulk but rather fly freely. The nest is on the ground or in a crevice. The eggs are pale, typically with spots or speckles, and the male may share some, at least, of the nest duties.

In New Guinea, there are two species of wagtails, both migrants from Asia, and two species of resident pipits.

### Key to *Motacillidae* Species (Adults)

1 Back streaked (genus *Anthus*): 2.
Back not streaked (genus *Motacilla*): 3.
2 Underparts buffy: *Anthus gutturalis.*
Underparts whitish with buffy spotted breast: *A. novaeseelandiae.*
3 Crown and back grey: *Motacilla cinerea.*
Crown grey, back greenish: *M. flava.*

### *Motacilla cinerea* (Tunstall)

Grey Wagtail. Length 7 in. Adults: upperparts grey; rump and upper tail-coverts olive-yellow; flight feathers black with a white bar across inner ones; tail black with outer rectrices extensively white; eyebrow and malar stripe white; throat black in summer, white in winter; rest of underparts clear, pale yellow. Wing 83 mm, tail 90 mm, culmen 17 mm, tarsus 28 mm, hind claw (chord) 7 mm. Immatures: duller; more greyish below, and with a few spots across breast.

RANGE Europe and Asia, wintering south to Africa, Malay Archipelago and New Guinea area where it has been recorded from many localities.

SUBSPECIES IN NEW GUINEA One, *melanope* (Pallas). (Also known as *caspica* and *robusta.*)

REMARKS This is the usual wagtail in New Guinea, but even so it is fairly uncommon. The birds are most often found along the edges of mountain streams in forest or in grassland. The birds also frequented the extensive mid-mountain gardens of the Snow Mountains. The slender, long-tailed shape, the walking gait, and the frequent up and down movement of the tail are quite distinctive.

### *Motacilla flava* (Linnaeus)

Yellow or Blue-headed Wagtail. Length 6½ in. Adults: crown blue-grey; rest of upperparts olive-green; wing quills fuscous, without white; tail feathers black with much white in two outer pairs; eyebrow stripe

white; ear-coverts greyish black; underparts yellow. Wing 80 mm, tail 72 mm, culmen 18 mm, tarsus 27 mm, hind claw (chord) 10 mm. Immatures: much duller with upperparts brownish olive, underparts dull buffy yellow, and an indication of a band of spots across upper breast.

RANGE Northern Africa, Europe, Asia, and western Alaska, wintering south to Africa and the East Indies to the New Guinea area (only two records, on the Mimika River and on Vogelkop).

SUBSPECIES IN NEW GUINEA One, *simillima* (Hartert).

REMARKS The green, not grey back, the shorter tail, and the very long hind claw distinguish this species from *M. cinerea*.

### *Anthus gutturalis* (De Vis)

New Guinea Pipit. Length 7 in. Adults: feathers of upperparts with blackish brown centres and olive-brown edges giving a streaked appearance; middle and greater wing-coverts broadly edged with pale brown; rump plainer olive-brown changing to buffy; tail feathers pointed, black edged with grey except for the outer pair which are brownish white, and the next to the outer pair which have a large white mark at the tip; underparts buffy, sides of throat with or without black markings; iris brown; bill black; feet dark horn-coloured. Wing 95 (93–103) mm, tail 70 mm, culmen 18·5 mm, tarsus 28 mm. Young birds have dark streaks on the breast.

RANGE Alpine grasslands in New Guinea, 8,500 to 15,000 ft.

SUBSPECIES Three:

a) *gutturalis* (De Vis); south-east New Guinea; black marks on side of throat forming a solid stripe.
b) *rhododendri* (Mayr); Huon Peninsula and Central Highlands; like *gutturalis* but upperparts more greenish; underparts darker.
c) *wollastoni* (Ogilvie-Grant); Snow Mountains; like *gutturalis* but black in side of throat reduced or absent.

NEST Probably on the ground in open grassland.

REMARKS The pipit was common on the alpine ridges where grass was short and scanty. Here it was found in pairs or small parties. The birds walked about, heads stretched up to their fullest extent to get a good view. They were sometimes shy. When alarmed they often flew to some vantage point, a rock or a branch of a tree in the forest edge. The song consists of several high notes running into a trill, a lower coarser trill, and other subdued musical calls and whistles. The trills were sometimes given as the birds sailed on set wings a short distance above the

ground. As they live where conditions are extreme, these birds feed on both insects and seeds.

***Anthus novaeseelandiae* (Gmelin)**
this includes *A. australis*
Richards Pipit. Length 6 in. Adults: feathers of upperparts with fuscous centres and buffy brownish edgings giving a streaked pattern, most prominent on crown, least so on rump which is nearly plain; outer pair of tail feathers mostly white, next pair with outer half white; underparts whitish with breast heavily spotted; flanks lightly streaked; iris brown; bill horn-brown with lower mandible pink at base; legs light brown. Wing 80–85 mm, tail 55–60 mm, culmen 14–15 mm.

RANGE Eastern Europe to Australia and New Zealand; in New Guinea known only from the mid-mountain grasslands of the Central Highlands (Wahgi area) and the Morobe district, from 3,500 to 8,000 ft.

SUBSPECIES IN NEW GUINEA One, *exiguus* (Greenway). Some students believe that the species *novaeseelandiae* as used here really includes more than one species.

NEST [A cup-shaped structure of dry grass placed on the ground and sheltered by a tuft of grass; eggs two to three, greyish white spotted with brown; size 23 × 16 mm. Australian data.]

REMARKS This pipit has a remarkably restricted range in New Guinea, especially when one considers the whole range of the species. It will undoubtedly be found elsewhere, but intensive work in some other grass areas has not found it. The species was common, however, in the Central Highlands, especially on the grassy airfields and in native gardens. As many as fifty to sixty birds were seen on a village football field.

## Family Turdidae *Thrushes*

*(300 species, five in New Guinea)*
The thrushes, as commonly understood, include some 300 species of small to medium sized song birds, most of which live in Africa, Eurasia and the Americas. Only five species occur in New Guinea, and these belong to three quite different groups. Because of the difficulty of recognizing the family, the three groups are each described below:

TRUE THRUSHES Two species; length 8–10 in.; bill, wing, tail, and legs moderate; nasal and rictal bristles obscure; bill slightly curved and with a small subterminal notch; wing pointed, outer primary small, one-third or less of next; tarsus booted; immature plumage spotted. The two species are easily separated on adult plumage:

Body plumage brownish black, bill yellow: *Turdus poliocephalus.*
Upperparts brown, underparts buffy white, both with black edgings to many feathers giving a scaled appearance: *Oreocincla dauma.*

CHATS One species; length 5–6 in.; a thrush with a smaller, more slender bill, rather slender legs; a slightly more rounded wing, outer primary about one-half of next; and rictal bristles moderate in size. The adult plumage is diagnostic; male, black with white upper wing-coverts, and upper and under tail-coverts; female, grey-brown, obscurely streaked or mottled with white upper and under tail-coverts; immature spotted: *Saxicola caprata.*

NEW GUINEA THRUSHES Two species; length 5–8 in.; bill moderate to slightly longer than head; wings rather short, rounded and much curved; tail rather short; legs long and fairly slender; nasal and rictal bristles conspicuous in larger species which also has beak distinctly curved; outer primary a little more than one-half next; tarsus booted; plumage uniform brown above; throat whitish contrasting with grey or fulvous of breast and flanks; immature plumage spotted. These birds might easily be taken for babbling thrushes (*Timaliidae*) as has happened in the past because of the short, rounded, curved wing. The two species are easily separated on size:

Length 5–6 in.: *Amalocichla incerta.*
Length 8 in.: *A. sclateriana.*

***Saxicola caprata* (Linnaeus)**

Pied Chat. Length 5½–6 in. Adult male: black except for white upper wing-coverts, lower rump and upper tail-coverts, vent and under tail-coverts; iris dark brown; bill black; legs black; wing 75–80 mm, tail 54–63 mm, culmen 17 mm, tarsus 24 mm. (Size varies with the subspecies.) Female: upperparts with white upper tail-coverts, rest dark greyish brown, many of the feathers with dark centres giving an obscurely mottled appearance; underparts: vent and under tail-coverts white, rest greyish brown, paler than back and palest on chin and abdomen, many of the feathers with dark central streaks giving an obscurely streaked appearance.

RANGE Southern Asia to New Guinea area; in New Guinea, locally in the lowlands of north New Guinea (Huon Peninsula to Hollandia), and in the mid-mountain grasslands from about 4,000 to 7,500 ft.

SUBSPECIES IN NEW GUINEA Three:

a) *aethiops* (Sclater); New Britain and north New Guinea; male wing 75 mm.
b) *wahgiensis* (Mayr and Gilliard); mid-mountains of Central High-

lands and south-eastern New Guinea; like *aethiops* but larger; wing 80 mm.

c) *belensis* (Rand); mid-mountain area of Snow Mountains; like *wahgiensis* but female paler.

NESTING On the ground in a little natural cavity in a bank or slope in grass country; nest cup-shaped, of coarse, soft, dead grass or other material, lined with finer grass; eggs two or three, greenish white, well spotted and blotched with earth brown, especially on larger end; size 20 × 14 mm. (Mafulu.)

REMARKS The chat is fairly common and lives only in areas of brushy secondary grassland in the mid-mountains and in the north coast lowlands. It is usually seen perched conspicuously on some shrub, from which it flies down to the ground for its insect prey. It is from such perches that the male gives its sweet song, or it may mount to some higher perch such as a dead tree in the grasslands. Strangely, the species is absent from the natural grasslands of south New Guinea.

***Turdus poliocephalus* (Latham)**

**Island Thrush.** Length 9–10 in. Adult male: generally brownish black with throat and upper breast slightly or somewhat paler and browner (one subspecies with throat and upper breast grey, and grey on rest of head and neck), feathers of rest of underparts more or less edged brown; iris brown; fleshy eye-ring yellow; bill yellow; feet yellow; wing 120–40 mm, tail 85–108 mm, culmen 25 mm, tarsus 33–40 mm (size varies with the subspecies). Female: similar but duller. Young: upperparts blackish brown, with small streaks and spots of pale rufous, and underparts dull reddish brown plentifully spotted with black.

RANGE On islands only, from Sumatra and Formosa to Samoa and Lord Howe Island; in New Guinea, in mountains in clearings in the forest at high altitudes and also above the timber line; from 7,500 to 13,500 ft.

SUBSPECIES IN NEW GUINEA AREA Five, as follows:

a) *papuensis* (De Vis); south-east New Guinea; throat and upper breast somewhat paler and browner than rest of underparts; wing 132 mm.

b) *keysseri* (Mayr); Saruwaged Mountains, Huon Peninsula; like *papuensis* but smaller; wing 120 mm.

c) *erebus* (Mayr and Gilliard) (also known as *carbonarius*); Central Highlands; like *papuensis* but darker and throat and upper breast more blackish; wing 124 mm.

d) *versteegi* (Junge); Snow Mountains; like *erebus* but larger; wing 140 mm.

e) *canescens* (De Vis); Goodenough Island; differs from all other races in the grey of throat and upper breast.

NESTING On rocky ledges above the timber line (also in trees?).

REMARKS The island thrush is a close relative of the European blackbird and the American robin. It is fairly common locally, but usually shy and solitary. Its main habitat seems to be forest edge, commonly at the timber line, rarely in forest clearings; it feeds on the ground in the open and flies to the shelter of the trees, in which it sometimes feeds on fruit. However, in the Snow Mountains, it was found far above the timber line near rocky cliffs which took the place of forest retreats at lower altitudes, and to which it flew when alarmed, often with a series of excited chirps. Though a few birds were found to have fed on insects, most of them had eaten vegetable matter, seeds of a sedge, and fruits of several kinds of trees and shrubs.

### *Oreocincla dauma* (Latham)

Scaled Ground Thrush. Length 8½–9 in. Adults: upperparts brown, brighter on rump and upper tail-coverts, each feather with a black margin giving a scaled pattern and the feathers of sides of the rump with a few partly concealed white markings; median and greater upper wing-coverts blackish, each with a pale, buffy spot at the tip; remiges edged with light brown; central tail feathers brown, lateral ones black, except for outermost which are pale brown with terminal half of inner web buffy white; side of head mottled black and buffy; throat buffy white; breast and flanks buffy, each feather edged with dark brown to black, giving a scaled appearance; abdomen and under tail-coverts buffy white; under wing-coverts black and white; underside of remiges fuscous with a white bar across them near base; iris brown; bill black; mandible whitish; legs pinkish white. Wing 115 mm, tail 80 mm, culmen 27 mm, tarsus 30 mm.

RANGE Asia to New Guinea and the Solomons; in New Guinea, in mid-mountains (2,500 to 4,000 ft) from Snow Mountains eastward.

SUBSPECIES IN NEW GUINEA One, *papuensis* (Seebohm).

NESTING [A cup of moss and roots, etc., in a tree five to ten feet up; eggs pale blue-green, freckled with red-brown. Asiatic data.]

REMARKS This is a rare bird found in the forest of the mid-mountains, where it lives on the shady ground and perches on shrubs and low trees.

### *Amalocichla sclateriana* (De Vis)

Greater New Guinea Thrush. Length 8 in. Adults: upperparts rather

dark olive-brown; a buffy ring around eye, a faint grey area in front of eye, and area below eye to ear-coverts dark brown faintly washed with buffy; chin and throat white, lightly flecked with grey; breast, sides of body and flanks dark grey; abdomen white; under tail-coverts tinged buffy; under wing with a pale buffy brown bar across inner remiges; iris dark brown; bill black, mandible paler; feet light greyish brown. Wing 106–12 mm, tail 74 mm, culmen 29–32 mm, tarsus 47 mm. Immature: upperparts patterned buffy brown and black; underparts pale reddish brown spotted with black.

RANGE Mountain forests of Snow Mountains and south-east New Guinea, 9,000 to 12,000 ft.

SUBSPECIES Two:

a) *sclateriana* (De Vis); south-east New Guinea.
b) *occidentalis* (Rand); Snow Mountains; like *sclateriana* but more rufous olive-brown and bill longer.

REMARKS Sclater's forest thrush is a shy retiring bird found on the forest floor, and though common locally, is seldom seen. It has, however, a distinctive, three-note whistle, and when a bird is retreating before one, keeping out of sight as much as possible, and only rarely mounting to a low perch, it may give a sharp, scolding call or softly whistled notes. The food of the species is insects and spiders.

### *Amalocichla incerta* (Salvadori)

Lesser New Guinea Thrush. Length 5½–6 in. Adults: upperparts rufous brown to dark brown, with narrow band from forehead nearly to eye grey or white (sometimes nearly obsolete); edges of remiges brighter rufous brown; side of head brown; throat white, sometimes with feathers obscurely tipped brown; rest of underparts ochraceous or olive-brown with abdomen similar or slightly paler, or whitish; iris brown; bill black; feet grey or grey-brown. Wing 84 mm, tail 56 mm, culmen 21 mm, tarsus 40 mm. Immature: plumage spotted.

RANGE Mountains of New Guinea, from 4,000 to 9,000 ft.

SUBSPECIES IN NEW GUINEA Three:

a) *incerta* (Salvadori); Arfak Mountains.
b) *brevicauda* (De Vis); mountains of eastern New Guinea (Sepik, Saruwaged, etc.); doubtfully distinct from *incerta*; underparts with less white?; throat less pure white?
c) *olivascentior* (Hartert); Wandammen, Weyland, and Snow Mountains; like *incerta* but upperparts deeper brown with less rufous tinge; breast and sides much less tawny, almost greyish brown; white feathers of sides of throat with conspicuous black tips.

REMARKS In the Snow Mountains, this species was a common bird on the forest floor where it travelled by hopping. Many birds were caught in traps set for small mammals.

## Family Timaliidae *Babblers*

*(280 species, fifteen in New Guinea)*

The babblers are a family of about 280 species. Most of them live in the Indo-Malaysian area, but there are a few in Africa and Australia. This family is not a satisfactory grouping as it is used to include a diversity of birds, some of which may not be very closely related. However, until a better alternative is proposed it seems advisable to continue to use it.

The fifteen species that live in New Guinea represent birds of several different types. Of some, such as the greater melampitta and the green-backed babbler, practically nothing is known beyond the specimens which have been collected. Of those on whose life histories we have some information, some live on the forest floor, some in the undergrowth and on the ground; two are noisy conspicuous tree birds, and one is a tree-creeper in habits.

The food in general is insects. The nest, so far as is known is a long pensile structure, a domed nest in a tree, a domed nest or an open cup on the ground, or a cup in a low hollow. The eggs are spotty, streaked, or plain white. The most notable breeding behaviour is the possible communal nesting of the grey-crowned babbler.

### Synopsis of New Guinea Genera

1 MELAMPITTA Two species of ground birds, length 7 or 11½ in., tarsus long, tail short, plumage all black.

2 CRATEROSCELIS Three species, birds of undergrowth and ground, length 4¾ in., tail short, tarsus long and slender, plumage above dull brown or black, below ochraceous or grey or buffy and white.

3 ANDROPHOBUS One species, length 6½ in., tail long, tarsus moderate, plumage above green.

4 DRYMODES One species, a ground bird, length 8 in., tarsus slender, feet small, tail long, upperparts dull earth-brown, flanks washed with grey.

5 CINCLOSOMA One species, a ground bird, length 9 in., tarsus slender, feet small, tail long, flanks chestnut or cinnamon.

6 EUPETES Three species, ground birds, length 8–9 in., tarsus slender, tail long, upperparts blue or chestnut or part blue part chestnut.

7 ORTHONYX One species, a ground bird, length 7¼ in., feet heavy, claws long and little curved, tail moderate, the shafts of the quills projecting as spines.

8 POMATOSTOMUS Two species, tree birds, length 9–10 in., tarsus moderate, feet large, tail long, bill more or less lengthened and down-curved.

9 IFRITA One species, a climbing tree bird, length 6½ in., feet and tail moderate, crown shining blue with black centre and margin.

**Key to *Melampitta* Species**

Length 7 in.: *M. lugubris.*
Length 11½ in.: *M. gigantea.*

***Melampitta lugubris* (Schlegel)**

Lesser Melampitta. Length 7 in. Adults: all black; bill and feet black; iris red. Wing 87 mm, tail 50–64 mm, culmen 23 mm, tarsus 42 mm. Immatures: some brown in underparts.

RANGE Mountain forests of New Guinea, 4,800 to 11,500 ft.

SUBSPECIES: THREE

a) *lugubris* (Schlegel); Arfak Mountains.
b) *rostrata* (Grant); Weyland and Nassau Mountains; bill larger.
c) *longicauda* (Mayr and Gilliard); central and eastern New Guinea; tail longer, 64 mm.

REMARKS This melampitta was a common bird on the slopes of the Wharton Range. It lived on the forest floor and though the dense undergrowth made it difficult to find, the bird was not shy and when disturbed had a little call of alarm, often repeated, which helped to locate it. This call, somewhat insect-like, was likened to the tapping together of two pebbles, a short sharp 'pit' or 'spit' sometimes doubled to 'pit-pit' or 'spit-it'. The birds were found as frequently in couples as singly, though not in the breeding season. They were active, nervous birds, continually hopping about on the ground, short tail somewhat cocked up and wings often flitted. Very occasionally one flew up to a low perch. The food consists chiefly of insects, including beetles and caterpillars and occasionally snails and fruit, judging by stomach contents.

***Melampitta gigantea* (Rothschild)**

Greater Melampitta. Length 11½ in. Plumage wholly black or brownish black. Wing 127 mm, tail 115 mm, culmen 37 mm, tarsus 58 mm.

RANGE Western New Guinea mountains (Arfak and Nassau Mountains), from 2,500 to 3,200 ft.

REMARKS This is one of the rare New Guinea birds. It has been suggested that it lives in the hill forests along creeks, and is a ground bird.

**Key to *Crateroscelis* (Mouse-babblers) Species**

1 Upperparts black; throat and breast rusty cinnamon: *C. nigrorufa.*
Upperparts brown: 2.
2 Lowland, and foothills: *C. murina.*
High mountains: *C. robusta.*

***Crateroscelis murina* (Sclater)**

Lowland Mouse-babbler. Length 4¾ in. Adult male: depending on the subspecies; top of head black to olive-brown; rest of upperparts dull brown, changing to reddish brown on rump and upper tail-coverts; underparts bright ochraceous paler on throat and more dusky brown on flanks; or the ochraceous largely replaced by white tinged fawn; iris scarlet; bill black, with mandible pinkish; feet grey. Wing 54–61 mm.

RANGE Lowland forest of New Guinea and its islands, up to 4,700 ft.

SUBSPECIES Five recognized:

a) *murina* (Sclater); Salawati, Batanta and Japen Islands and New Guinea except middle Fly River area; male with crown black; wing 61 mm, tail 39 mm, culmen 15 mm, tarsus 23 mm.
b) *monacha* (Gray); Aru Islands; like *murina* but underparts white except for fawn on lower throat and brownish flanks and sides of breast.
c) *pallida* (Rand); middle Fly River area; crown olive-brown, underparts with much white.
d) *capitalis* (Stresemann and Paludan); Waigeu Island; crown olive-brown, underparts ochraceous; size smaller, wing 57 mm.
e) *fumosa* (Ripley); Misol Island; crown blackish brown, underparts ochraceous; size smaller, wing 54 mm.

REMARKS A fairly common forest bird haunting areas where the undergrowth was fairly dense. It fed largely on the forest floor where it hopped about, and when alarmed occasionally going up into the low shrubbery. It has a chattering, rattling call, given when it is disturbed.

***Crateroscelis nigrorufa* (Salvadori)**

Mid-mountain Mouse-babbler. Length 4¾ in. Adults: upperparts black; underparts from chin to lower breast rich rusty cinnamon, flanks brown, abdomen like breast or black, depending on subspecies. Wing 59 mm.

RANGE Lower mountains, 4,100 to 5,800 ft from south-eastern New Guinea to Snow and Weyland Mountains.

SUBSPECIES Two recognized:

a) *nigrorufa* (Salvadori); mountains of south-eastern New Guinea and

Herzog and Saruwaged Mountains; abdomen like breast; wing 59 mm, tail 41 mm, culmen 17 mm, tarsus 24 mm.

b) *blissi* (Stresemann and Paludan); north slope of Snow and Weyland Mountains; abdomen black washed with olive.

REMARKS In habits this species is similar to the lowland mouse-babbler, but Stein found it more frequently going up into the shrubbery of the undergrowth.

***Crateroscelis robusta* (De Vis)**

Mountain Mouse-babbler. Length 4¾ in. Adult male: upperparts dark olive-brown or rufous, slightly more rufous on upper tail-coverts; underparts entirely dull rufous brown or with white throat and breast and dusky flanks and abdomen; with or without a slaty breast band; iris yellow to red; bill brown; feet grey-brown. Females: similar or duller. There is considerable individual variation in regard to rufescent, olive or grey tone as well as pronounced geographical variation in colour and pattern.

RANGE Higher mountain forests of New Guinea, from 4,500 to 12,000 ft.

SUBSPECIES Five recognized, some quite different:

a) *robusta* (De Vis); mountains of south-eastern New Guinea, Herzog, Saruwaged and Sepik Mountains; male with white throat and distinct slaty breast band; wing 60 mm, tail 41 mm, culmen 16 mm, tarsus 28 mm.

b) *sanfordi* (Hartert); Victor Emanuel, Hindenburg and Snow Mountains west to Wandammen area; whole underside dull rufous brown; upperparts deep brown; wing 62–68 mm.

c) *deficiens* (Hartert); Cyclops Mountains, north New Guinea; like *robusta* but upperparts deeper brown; upper tail-coverts less rufous; and lacks slaty breast band of male.

d) *peninsularis* (Hartert); Arfak Mountains, Vogelkop; like *deficiens* but more white in breast.

e) *ripleyi* (Mayr and de Schauensee); Tamrau Mountains, Vogelkop; like *peninsularis* but general tone greyish, less rufous brown.

REMARKS Two or three white-throated mouse-babblers were usually found together on or near the forest floor where the undergrowth and ground cover was so dense it was difficult to see what they were doing. The first intimation of their presence was often their buzzing 'chee' of alarm, sometimes repeated a number of times as though scolding. Then, quiet as mice they might retreat unseen over the ground for some distance before mounting into shrubbery where the shaking of the plants betrayed their location. Though secretive, they were not always shy and

hopped about in the shrubbery at close range, and sometimes they responded to squeaking.

This species feeds largely on the ground, hopping about and picking up small insects. Besides its buzzing call the bird has a whistled song of three notes, the first the longest; a song that varied greatly in quality.

Birds from higher altitudes are noticeably larger than those from lower altitudes. Though the eye is orange-yellow in life, it may change at death to whitish.

### *Androphobus viridis* (Rothschild and Hartert)

Green-backed Babbler. Length 6½ in. Adult male: upperparts dark green; side of head black except for white malar streak; chin, throat, and centre of breast black; abdomen grey; sides of breast and flanks green; wing 68 mm, tail 70 mm, culmen 17 mm, tarsus 26 mm. Female: similar but side of head green, and throat and centre of breast grey, like abdomen; wing 67 mm. Webs of tail-feathers somewhat soft and disintegrated.

RANGE Snow and Weyland Mountains, 4,800 to 9,000 ft.

REMARKS Seven specimens were collected on the north slope of the Snow Mountains, by an Archbold Expedition, but all were brought in by natives. Four of them had insects in their stomachs. This is a rare bird.

### *Drymodes superciliaris* (Gould)

Scrub Robin. Length 8 in. Adults: upperparts generally earth-brown, darker on the crown, more reddish brown on rump and upper tail-coverts; a white spot in front of eye; ear-coverts pale grey; a black spot above eye and another below eye and extending as a bar to in front of ear-coverts; median and upper wing-coverts black, tipped white; remiges black, edged greyish brown; primaries with a white mark near base and another half-way to tip in outer webs; central tail feathers like back; outer feathers broadly tipped white; underparts generally greyish white, whiter on throat, more tinged dusky on breast, and dusky grey or brownish grey on sides of breast and flanks; under wing with coverts tipped white and a white bar across remiges. Wing 92 mm, tail 95 mm, culmen 21 mm, tarsus 41 mm.

RANGE Parts of south-east, central, and west New Guinea, sea level to 4,000 ft, and north-eastern Australia.

NEW GUINEA SUBSPECIES Three:

a) *brevirostris* (De Vis); south-east to south (Oriomo River) New Guinea and Aru Islands; upperparts tinged cinnamon.
b) *nigriceps* (Rand); Cyclops Mountains and north slope of Snow Mountains; upperparts darker and duller brown; crown brownish black in the male.

c) *beccarii* (Salvadori); Arfak and Wandammen Mountains; like *nigriceps* but back slightly lighter and crown dark brown.

NESTING [Nest cup-shaped, in a hollow scooped in the ground, of small sticks and lined with fine fibres; eggs two, stone-grey, thickly blotched with brown. Australian data.]

REMARKS A ground bird of the forest. One was seen bathing in a shallow pool on the swampy edge of the forest and when it finished bathing it hopped on to a log to preen. Sometimes this bird is considered a thrush and put in family Turdidae.

***Cinclosoma ajax* (Temminck)**

Ajax Scrub Robin. Length 9 in. Adult male: upperparts generally earth-brown; side of head from nostril to side of neck black and below it a broad white mark from base of mandible to below ear-coverts; chin, throat, and centre of upper breast black; sides of breast and flanks bright rufous brown; mixed with black along edge of centre of breast and abdomen which are white; upper wing-coverts and bases of primaries black; central tail feathers like back, outer ones black broadly tipped white; under wing-coverts white marked with black and underside of remiges grey without pattern; wing 103–14 mm. Female: similar to male but smaller and lacks most of the black; a white line from eye to nape; lores to side of neck dark brown; chin and throat to eyes white; upper breast rich rufous brown which extends on sides to flanks; centre of lower breast and abdomen dirty white; wing-coverts brown like back except for a few median coverts, feathers at bend of wing, and primary coverts which are black with small white tips; wing 92–110 mm.

RANGE Lowlands in south-east and south and locally in west New Guinea.

SUBSPECIES Four:

a) *ajax* (Temminck); western coast of Geelvink and Triton Bays; as described; male wing 114 mm, female wing 110 mm.
b) *muscalis* (Rand); upper Fly River; like *ajax* above but with paler, less brightly coloured flanks; male wing 108 mm.
c) *alaris* (Mayr and Rand); lower and middle Fly River area; like *muscalis* but upperparts much paler; male wing 110 mm, female wing 100 mm.
d) *goldiei* (Ramsay); south-east New Guinea (Milne Bay to Hall Sound); like *alaris* but with paler upperparts, brighter flanks, female with less spotting in wing; size smaller; male wing 103 mm, tail 100 mm, culmen 27 mm, tarsus 35 mm; female wing 92 mm.

REMARKS Presumably a bird of the forest floor; food, insects.

**Key to *Eupetes* Species**

(Some authors separate these birds in the genus *Ptilorrhoa*.)

1 Wing-coverts black with white spots: *E. leucostictus*.
Wing-coverts blue, without spots: 2.

2 Back all blue: *E. caerulescens* (most subspecies).
Back partly or wholly chestnut: 3.

3 Breast and abdomen blue: *E. castanonotus*.
Breast and abdomen chestnut-brown: *E. caerulescens geislerorum* (female).

***Eupetes castanonotus* (Salvadori)**

Mid-mountain Eupetes. Length 9 in. Adult male: crown to foreback chestnut; lower back, rump and wings blue; eyebrow stripe blue; line from nostril to ear-coverts black; throat white bordered posteriorly by a black line; rest of underparts blue; white spotting on under tail-coverts present or absent; iris brown; bill black; feet grey-brown; wing 94–100 mm. Female: like male but with whole upperparts chestnut (lower back blue in one subspecies); eyebrow stripe rust-coloured in one subspecies; wing 92–97 mm.

RANGE Lower mountain slopes of New Guinea, 1,900 to 4,100 ft.

SUBSPECIES Six:

a) *castanonotus* (Salvadori); Vogelkop; female whole back chestnut; eyebrow stripe blue.
b) *saturatus* (Rothschild and Hartert); Nassau Mountains; like *castanonotus* but back much darker chestnut and underparts deeper blue, more purple.
c) *burgersi* (Mayr); Sepik Mountains; most like *saturatus* but upperparts brighter and underparts paler.
d) *par* (Meise); Sarawaged Mountains; most like *saturatus* but forward edge of mantle brighter chestnut and female with paler blue to whitish eye stripe.
e) *pulcher* (Sharpe); south-eastern New Guinea west to Hertzog Mountains; differs from other races in having eyebrow stripe cream-coloured, not blue; male wing 97 mm, tail 107 mm, culmen 29 mm, tarsus 35 mm; female wing 92 mm.
f) *uropygialis* (Rand); northern slopes of Snow Mountains; differs from other races in female having lower back blue as in male; eyebrow stripe blue.

REMARKS A bird of the forest floor with habits similar to those of other eupetes.

***Eupetes caerulescens* (Temminck)**

Lowland Eupetes. Length 8¾ in. Adult male: generally blue except for

white throat which is edged by a black band from bill to side of neck and across breast; iris brown; bill and feet black; wing 88–93 mm. One subspecies with a brown crown. Female: two types of plumage depending on subspecies, (a) in general like male but with or without white superciliary line, or (b) differs from male in having upperparts dusky brown, rump, upper surface of tail, and underside of body deep chestnut-brown; wing 82–87 mm.

RANGE New Guinea lowland forests.

SUBSPECIES Four:

a) *caerulescens* (Temminck); Misol and Vogelkop; female similar to male but white of throat reaches eye.

b) *neumanni* (Mayr and de Schauensee); north New Guinea (Takar to Astrolabe Bay); like *caerulescens* but black of lores joined to black of ear-coverts below eye.

c) *nigricrissus* (Salvadori); southern New Guinea (Etna Bay to Milne Bay); like *neumanii* but female with white superciliary; under tail-coverts partly black; male wing 93 mm, tail 96 mm, culmen 24 mm, tarsus 33 mm; female wing 87 mm.

d) *geislerorum* (Meyer); north-eastern New Guinea (Huon Gulf to Collingwood Bay); male crown brown; female very different in having upperparts dusky brown; rump, tail and undersurface of body chestnut.

NESTING A deep cup of dead leaves in a depression in the ground at the base of a tree in forest or glade, and with a lining of fine rootlets at the bottom. Eggs two, brownish white heavily marked with spots and short longitudinal streaks of light and dark brown; size 23·5 × 19·2 mm. Nestling down above greyish brown; adult very shy at nest.

REMARKS This was a common species on the forest floor usually seen in pairs and rather shy. Where the undergrowth was dense it was difficult to catch more than a glimpse of the birds as they ran ahead or made short whirring flights when hard pressed. The alarm call, a sharp 'chit chit-chit', was heard more often than the bird was seen.

Where the undergrowth was more open, however, I watched one of these dainty creatures walking about unconcerned. It had the forepart of the body slightly depressed and the tail slightly raised and spread. The bird walked rapidly, apparently looking for its insect food on the leaf-covered ground, head bobbing and tail twitching with each quick step, now and then pecking at some object on the ground.

Besides the common alarm call this bird sings a whistled 'dee dee . . .', the series ending with a sharply whistled 'chit', and I suspect that a whistled song of two syllables, the first low, the second loud and

strongly accented, heard from the undergrowth, is also given by this species.

***Eupetes leucostictus* (Sclater)**

High Mountain Eupetes. Length 8 in. Adults: colour varies with subspecies; top of head and neck chestnut; back, rump and upper tail-coverts dark green or chestnut; wing-coverts black ornamented with white spots; lores, streak behind eye, chin and throat black; each side of neck with white patch which may or may not meet across lower throat; upper breast with a triangle of black with or without white spots; underparts of body variously ashy blue and olive-green; under tail-coverts with or without white tips; outer tail feathers tipped white. Male wing 78–84 mm, female wing 75–78 mm.

RANGE New Guinea mountains, 3,900 to 6,000 ft.

SUBSPECIES Six:

a) *leucostictus* (Sclater); Vogelkop; back olive-green; black triangle on upper breast with white spots; breast and abdomen bluish ashy.
b) *loriae* (Salvadori); south-east New Guinea to Herzog and Sepik Mountains; like *leucostictus* but black triangle on upper breast without white spots; breast and flanks dull greenish; abdomen blue.
c) *sibilans* (Mayr); Cyclops Mountains; like *loriae* but with distinct olive-green breast band and brighter chestnut crown.
d) *amabilis* (Mayr); Sarawaged Mountains; like *leucostictus* but underparts mostly blue.
e) *mayri* (Hartert); Wandammen Mountains; like *leucostictus* but back chestnut; black triangle on upper breast with reduced spotting.
f) *centralis* (Mayr); Snow Mountains; like *mayri* but breast greenish olive (not blue); male wing 84 mm, tail 95 mm, culmen 23 mm, tarsus 32 mm.

NESTING Nest in a natural hole near forest floor in base of tree or tree-fern stump on an untidy foundation of sticks, ferns and dead leaves; inner cup of fine rootlets lined with skeletons of leaves; eggs two, pinkish, obscurely spotted; size 29·5 × 21·5 mm. Young with dense down on upperparts; both sexes feed young, five to eleven times per hour, and remove excrement; young hiss like snakes when disturbed (Loke Wan Tho).

REMARKS A bird found on the forest floor; not uncommon but very elusive. Archbold watched a party of five birds walking about, moving aside the fallen leaves with a quick sideways movement of the bill as they sought for food. This includes insects and one record of seeds of some fruit (four stomachs examined, Rand), and a small frog (Loke Wan Tho).

### *Orthonyx temminckii* (Ranzani)

Logrunner. Length 7¼ in. Adult male: crown and back brown, each feather conspicuously edged with black; lower back and rump rufous brown; wing-coverts black tipped with grey, face ashy; throat white; sides of breast grey; flanks grey and olive-brown; centre of breast and abdomen mixed grey and white; wing 91–95 mm. Female: similar but brown of upperparts brighter; wing-coverts edged with buffy brown; throat buffy brown or ochraceous; flanks browner; wing 81–86 mm.

RANGE New Guinea mountain forests, 3,900 to 9,300 ft; also eastern Australia.

NEW GUINEA SUBSPECIES Four:

a) *novaeguineae* (Meyer); Vogelkop; male wing 93 mm, tail 74 mm, culmen 16 mm, tarsus 32 mm; female wing 81 mm.
b) *victoriana* (van Oort); south-eastern New Guinea to Hertzog Mountains; like *novaeguineae* but with less white in underside and rump darker.
c) *dorsalis* (Rand); Snow Mountains; differs from *novaeguineae* and *victoriana* in having black margins of dorsal feathers wider and the grey of sides of breast darker.

NESTING A rounded, domed structure of moss, tough root fibres and small plant stems lined with soft fibres [placed on the ground]; a single white egg; size 22 × 29 mm. (Ripley.)

REMARKS A quiet, rather stolid and shy bird found on the forest floor where it walks and runs about in the heavy shade. Sometimes it goes in small parties of three or four individuals. S. D. Ripley writes that it has a loud, melodious whistle, and one bird shrieked when wounded, which brought the rest of its party towards it. Natives told him the bird digs holes in which to shelter itself from the rain and a wounded bird took shelter in such a hole. In south-eastern New Guinea I found many scratched-up places in the forest, presumably the work of this bird, for which its remarkably heavy feet seem especially suitable, and it probably obtains its insect food in this manner. The use, if any, of the strange spine-tipped tail is not known.

### Key to *Pomatostomus* (Tree-babblers) Species

Broad white eyebrow stripe: *P. temporalis.*
No such stripe: *P. isidori.*

### *Pomatostomus isidori* (Lesson and Garnot)

also known as *Garritornis isidorei*

Rufous Babbler. Length 10 in. Adults: upperparts crown to rump dark earth-brown; upper tail-coverts, tail and wings rich rufous brown; whole underparts ferrugineous, darker and duller posteriorly; underside

of tail rufous; iris brown; bill orange-yellow, greyish at base and blackish about nostril; feet grey-brown.

RANGE Misol and New Guinea lowland forests; sea level to 1,600 ft.

SUBSPECIES Two:

a) *isidori* (Lesson and Garnod); Misol and New Guinea except the north; underparts paler; male wing 118 mm, tail 118 mm, culmen 28 mm, tarsus 34 mm; female wing 108 mm.
b) *calidus* (Rothschild); north New Guinea (Geelvink Bay to Astrolabe Bay); underparts and wing darker.

NESTING Nest a bulky pensile structure up to six and a half feet long and one foot in diameter, hung from a dangling vine or branch fifteen to twenty-five feet up in the forest. This structure is composed of strips of wild pandanus leaves and other dried fibres loosely intertwined. The nest proper, about one-third the distance from the bottom, is domed, with a side entrance, and lined with green bamboo leaves, thin strips of pandanus leaves, and skeletonized tree leaves. Male and female feed fledgling young.

REMARKS In parties of five to eight individuals the rufous babbler moves through the shrubbery and the tops of the low trees in the forests. The birds keep close together and other smaller birds often associate with them. These babblers are always ready to respond to squeaking and when excited are noisy, uttering loud whistled notes as well as a soft, 'ca-co-co-co'. Once I watched two adults feeding their young. The young were about ten feet up in a sapling in a dark, very shady place. The adults searched the branches, twigs and vines of the lower part of the forest, the undergrowth, and even the ground for food which they carried to the young. The recorded food of this species is insects of small to medium size (including katydids, crickets and caterpillars), and small lizards. At night the parties of rufous babblers retire into their nests to sleep.

### *Pomatostomus temporalis* (Vigors and Horsfield)

Grey-crowned Babbler. Length 9½ in. Adults: crown with a grey stripe down centre bordered by a broad white stripe, which reaches the eye and extends from nostril to side of nape; hind neck grey, shading into dusky black rump and upper tail-coverts; tail above black with broad white tips to lateral feathers; upper wing-coverts blackish brown, remiges black; side of face dusky grey; underparts, chin to breast white changing to brownish on lower breast, and chocolate-brown on abdomen; under tail-coverts black with white tips. The dark plumage becomes much paler with wear and fading. Male wing 116 mm, tail 92 mm, culmen 32 mm, tarsus 33 mm. Female wing 113 mm.

RANGE South New Guinea and Australia.

NEW GUINEA SUBSPECIES *P. t. strepitans* (Mayr and Rand); Digul to Fly River area in savannah lowlands; as described.

NESTING An oval structure with entrance at side, placed among terminal twigs of a branch fifteen to thirty feet up; often in loose groups with four or five nests within a few yards radius; nest composed externally of twigs with a dense lining of rather coarse shredded bark. [Eggs two or three, brown streaked all over with hairlines of darker brown; size 28 × 20 mm. Australian data.]

REMARKS In the open savannah country of south New Guinea where low trees and shrubs are spaced out in the grassland, the grey-crowned babbler is a common bird, always in parties of six to ten individuals. Sometimes they were seen low in the shrubs of the savannah, sometimes well up in the trees. They all kept together uttering soft whickering calls, and a number often sat close together on the same branch. The parties were continually moving. One or two birds would fly on ahead, then the main party would fly to join them, all calling softly together. As the laggards came hurrying up, the leaders would fly on again. A common pose was with the head held low and tail cocked up. Groups of their nests were common sights in the savannah and as nest construction was going on when no birds in breeding condition were recorded, it may well be that some nests are built for sleeping in at night. It is possible that these groups of nests are communal structures.

### *Ifrita kowaldi* (De Vis)

Blue-capped Babbler. Length 6½ in. Adults: crown shiny blue with a black patch in centre and a marginal line of black; lores whitish; back of neck with a semi-concealed patch of ochraceous; rest of upperparts dark olive; upper wing-coverts tipped with small buffy spots; side of face with a small white line above eye, a white or buffy line behind eye; ear-coverts dusky mixed with buffy ochraceous; underparts ochraceous, paler on throat and olive on flanks; iris brown; bill brown, paler below; feet grey-olive. Male wing 86 mm, tail 62 mm, culmen 29 mm, tarsus 28 mm. Female wing 84 mm. Immature birds: less blue on the crown, and the eyebrow stripe rusty rather than white.

RANGE Mountain forests in eastern and central New Guinea, 4,800 to 11,800 ft.

SUBSPECIES Two:

a) *kowaldi* (De Vis); eastern New Guinea west to central Snow Mountains; upperparts clear olive.

b) *brunnea* (Rand); western Snow Mountains (Nassau and Weyland

Ranges); upperparts brownish olive and remiges and rectrices more rufous brown.

NESTING Twelve feet up in a slender sapling, 'a circular cup' (a domed nest?), bulky and heavily decorated with moss; one young reported (L. W. Tho).

REMARKS Though there is little in its structure to indicate it, the blue-capped babbler has taken over the habits of a creeper. It is not restricted to any part of the forest. Besides searching for food on the smaller branches, and even on fallen logs, it very often climbs in a creeper-like, or almost nuthatch-like manner, up the trunks of saplings and trees and explores the branches of the treetops for food. The moss on the trees is not neglected and this babbler often digs vigorously into it for its prey. On the horizontal branches it creeps along the top and sides, rarely venturing on to the underside where it has difficulty in maintaining a foothold. To examine the under part of a branch it more often hops along the branch peering down from one side, or the other, hanging head down but not upside down. Two or three of these birds often go about together, sometimes associated in feeding parties with various species. They are sometimes noisy birds repeatedly calling a sharp 'quit' or 'truit' and they have a whistled continuous song. Apparently both parents feed the newly fledged young. The food of the species is entirely insects (five stomachs examined).

## Family Maluridae *Wren Warblers*

*(Eighty-five species, five in New Guinea)*

This is a group of some eighty-five species, found mostly in Australia. The New Guinea species are small long-tailed birds that hop about in the forest shrubbery or (one species) in the tall grass and shrubbery of open country. The best known species cock the tail over the back in a characteristic pose, but some species are rare and little known.

A synopsis, instead of a key, of the four New Guinea genera (five species) is as follows:

a) MALURUS ALBOSCAPULATUS Length 4–4½ in.; bill moderate and stout. Male: black with white scapular patches. Female: like male, or with white underparts, or without white scapular patches and with upperparts brown, underparts white. (The only grassland species.)

b) TODOPSIS CYANOCEPHALA Length 5–5½ in.; bill fairly long and somewhat flattened. Male: shiny blue and black. Female: head blue and black, back rufous.

c) T. WALLACII Length 4½ in.; crown black spotted blue; back rufous; underparts white (sexes alike).

d) CHENORHAMPHUS GRAYI Length 5–5½ in.; bill somewhat lengthened and very flattened and broad; much pale blue or greyish blue in plumage; wings brown.
e) CLYTOMYIAS INSIGNIS Length 5½–6 in.; bill somewhat lengthened and very flat and broad; colour rufous, olive and buffy.

***Malurus alboscapulatus* (Meyer)**

Black and White Wren Warbler. Length 4–4½ in. Adult male: black with conspicuous white scapular patches above bend of wing; adult female varies greatly with the subspecies: like male, or differs from male in having whole or most of underparts white, upperparts black to fuscous, and wing feathers greyish black edged with grey, or female without white scapular patch, with upperparts brown to fuscous, and underparts white except for ochraceous flanks. Immatures: like female, or in some races with underparts, except throat, black. Iris brown; bill black; feet grey. Sexes are similar in wing length, females have longer tails than males, measurements vary with subspecies. Wing 43–54 mm, tail 36–52 mm, culmen 12–15 mm, tarsus 20–23 mm.

RANGE New Guinea lowland and mid-mountain grasslands, up to about 7,000 ft.

SUBSPECIES IN NEW GUINEA Ten:
a) *alboscapulatus* (Meyer); Arfak Mountains; female, blackish above, wings fuscous edged with grey, underparts white; wing 50 mm, tail 40–46 mm.
b) *aida* (Hartert); northern New Guinea lowlands from Weyland Mountains to Humboldt Bay; female, black above and below; wing 49 mm, tail 36–42 mm.
c) *tappenbecki* (Reichenow); northern New Guinea lowlands from Sepik area to Ramu River; like *alboscapulatus*, but female blacker above, and with less pale edges to remiges; wing 46 mm, tail 34–46 mm.
d) *moretoni* (De Vis); south-eastern New Guinea lowlands, west to Huon Peninsula in the north, to Port Moresby in the south; like *aida* but smaller, and immatures with more white in underparts; wing 46 mm, tail 36–47 mm.
e) *naimii* (Salvadori and D'Albertis); south-eastern New Guinea lowlands from Galley Reach to Yule Island; like *tappenbecki*, but female with more black on sides of body; wing 46 mm, tail 38–47 mm.
f) *mafulu* (Mayr and Rand); south-eastern New Guinea in mid-mountain grasslands and Central Highlands to Telefomin area; like *alboscapulatus* but with more black in sides of body; wing 49 mm, tail 43–54 mm.
g) *dogwa* (Mayr and Rand); south New Guinea lowlands (Fly River

to Merauke); differs from all the above in female having no black in plumage, and in lacking the white scapular patch; upperparts brown; underparts white, except for deep buff flanks; wing 43 mm, tail 37–47 mm.

h) *lorentzi* (van Oort); south New Guinea lowlands (Noord River to Mimika River; like *dogwa*, but female darker above, crown fuscous and with flanks with less buff; size larger; wing 49 mm, tail 43–47 mm.

i) *balim* (Rand); mountain valleys (Balim, Bele Rivers) of Snow Mountains; like *lorentzi*, but female with more ochraceous in flanks and tail longer; wing 49–52 mm, tail 44–57 mm.

j) *randi* (Junge); Wissel Lake, western New Guinea; female like *aida*, but larger; wing 54 mm.

NESTING Probably a domed structure, with entrance on the side, and placed low in a bush or a tussock of grass, as is the case with related species in Australia.

REMARKS This wren warbler is common in the tall grass areas of the savannahs and of the secondary grasslands, especially where they were dotted with clumps of shrubbery, and also in the tall grasses of the marshes. It also ventures into the edge of second growth. The birds usually went in parties of four or five individuals, skulking in the grass and coming up to perch on exposed grass stems. When closely approached, the birds flew a short distance with slow, jerky flight.

***Todopsis cyanocephala* (Quoy and Gaimard)**

Blue Wren Warbler. Length 5–5½ in. Adult male: crown and patch on nape shiny blue; foreback and scapulars light blue; remiges black, inner ones broadly edged with blue; upper wing-coverts broadly edged blue; upper tail-coverts and rectrices blue-black; side of head, sides of back of neck and rump velvety black; chin and throat, lower breast and flanks deep blue; a band across upper breast and abdomen black; iris brown; bill brown to black; feet grey-brown to blackish; wing 60 mm, tail 56 mm, culmen 19 mm, tarsus 26 mm. Female: crown and hind neck shining blue; back, upper wing-coverts, rump and inner secondaries rufous; outer remiges narrowly edged with rufous; tail black with a bluish gloss, and broadly tipped with white; sides of head and neck black glossed with blue; breast and abdomen white; flanks rufous; wing 56 mm.

RANGE New Guinea lowlands up to 2,500 ft, also Salawati, Biak, and Aru Islands.

SUBSPECIES Four very similar ones, differing in depth of colour:

a) *cyanocephala* (Quoy and Gaimard); Salawati, western New Guinea, in south to Etna Bay; male with blue of upperparts pale.

b) *dohertyi* (Rothschild and Hartert); north New Guinea (Mamberamo River to Ramu River); like *cyanocephala* but female with darker rufous back.
c) *bonapartii* (Gray); Aru Islands and south New Guinea (Mimika River to Astrolabe Mountains); like *dohertyi* but blue of male darker.
d) *mysorensis* (Meyer); Biak Island, Geelvink Bay; like *dohertyi* but female with a darker blue crown.

NESTING Nest gourd-shaped with opening on side; in a bush three feet up; of pieces of fern, strips of leaves and pieces of moss all tightly woven together; contained four young (Ripley).

REMARKS The blue wren lives most commonly in the tangled undergrowth and bamboos along forest edges, streams and swamp, and it is absent from both open bush country and the heavy forest. Often in pairs or small parties, the birds hop about in the low shrubbery, the tail cocked over the back; and they are inquisitive, coming readily to squeaking calls. The birds themselves often give a pleasant song of trills, and warbles, and also give scolding notes.

### *Todopsis wallacii* (Gray)

Wallace's Wren Warbler. Length 4½ in. Adults: crown black, many of the feathers tipped with pale blue; sides and back of neck, back and rump pale rufous; median and greater upper wing-coverts dull brown conspicuously tipped with white; remiges fuscous, inner secondaries washed with rufous; rectrices fuscous, central ones narrowly, outer more broadly tipped with white; side of head black with a white mark below the eye; underparts white, breast washed with buff in some specimens; iris brown; bill black with pale tip; feet dusky. Wing 48 mm, tail 50 mm, culmen 17 mm, tarsus 21 mm.

RANGE New Guinea lowlands up to 3,000 ft, also Misol, Japen and Aru Islands.

REMARKS Wallace's wren warbler is similar to the blue wren warbler in habits, and occurs in the same habitat, but it also occurs commonly in the forest where it ventures up into the lower substage trees.

### *Chenorhamphus grayi* (Wallace)

Broad-billed Wren Warbler. Length 5–5½ in. Adult male: crown dull greyish blue, with or without blackish grey streaks; back greyish blue, rump deeper blue; upper wing-coverts and remiges edged with brown; rectrices brown, externally bluish and tipped white; underparts pale blue; throat whitish; iris brown; bill black; feet light brown; wing 62 mm, tail 72 mm, culmen 19 mm, tarsus 27 mm. Female: like male, but

crown black with a pale blue stripe over each eye; a black band behind eye; and chin and abdomen white; wing 59 mm.

RANGE Salawati, Vogelkop, Amberpon Islands, and north New Guinea east to the Sepik area; lowlands up to about 3,000 ft.

REMARKS This is one of the rare New Guinea birds. It is recorded as hopping about in low bushes near the ground in the dense shade of the rain forest.

***Clytomyias insignis* (Sharpe)**

Rufous Wren Warbler. Length 5½–6 in. Adults: top and sides of head rufous; back olive-brown, upper wing-coverts and edges of remiges browner olive; upper tail-coverts and rectrices pale rufous brown to fuscous washed with brown; underparts ochraceous, paler on throat and darker and more olive on flanks; iris brown; bill black; feet brown. Male wing 60 mm, tail 73 mm, culmen 18 mm, tarsus 27 mm. Female wing 58 mm.

RANGE Mountains of New Guinea, from 5,000 to 9,000 ft.

SUBSPECIES Two:

a) *insignis* (Sharpe); Arfak; underparts pale.
b) *oorti* (Rothschild and Hartert); Snow Mountains, Central Highlands, and south-eastern New Guinea; like *insignis* but underparts darker and with less white in throat.

REMARKS This is an uncommon forest bird found in the undergrowth and the substage trees of the mountain forests.

## Family Sylviidae *Warblers*

This is a species-rich family, well developed in Africa, Eurasia and the Indo-Australian area, and a few species in the Americas. It is treated here under two headings: Grass Warblers and Tree Warblers.

### Grass Warblers

*(Six species in New Guinea)*

The six species included here belong to a species-rich group of warblers most common in southern Asia and Africa. The six New Guinea birds live in the taller grass and shrubbery of savannah, old fields, and alpine swamps.

#### Key to Grass Warblers

1 Back uniform: 2.
  Back streaked: 3.

2 Breast grey: *Locustella fasciolata.*
Breast yellowish white: *Acrocephalus arundinaceus.*
3 Length 7–9 in.; tail very long and graduated: *Megalurus timoriensis.*
Length 5½–6 in.; tail moderate, graduated: 4.
Length 3½–4½ in.; tail short to moderate, rounded: *Cisticola exilis.*
4 Crown streaked; bill ½ in.: *M. gramineus.*
Crown not streaked; bill ¾ in.: *M. albolimbatus.*

***Locustella fasciolata* (Gray)**

Grasshopper Warbler. Length 7 in. Adults: upperparts russet-brown, more olive on crown and mantle and more rufous on rump and upper tail-coverts; superciliary stripe pale grey; cheeks and throat greyish white; lores and ear-coverts like crown; breast grey; abdomen yellowish white; flanks and under tail-coverts pale olive-brown; iris brown; bill dark brown, mandible paler; feet pale brown. Male wing 84 mm, tail 72 mm, culmen 23 mm, tarsus 30 mm. Female wing 79 mm. Immatures: much darker, more olive-brown; underside yellowish, with sides and forebreast greyish brownish, and forebreast with dark tips to feathers, giving a faintly spotted appearance.

RANGE Central and eastern Siberia, migrating in winter to Philippines, Celebes, South East Islands, and western New Guinea, where it seems to be rare.

REMARKS This migrant is a bird found in dense thickets, tall grass and the underbrush of forest edges, where it is shy and retiring.

***Acrocephalus arundinaceus* (Linnaeus)**

Great Reed Warbler. Length 6½ in. Adults: upperparts yellowish olive-brown, duller on crown, brighter on rump; an indistinct, pale superciliary line; underparts: throat whitish, shading into pale buffy white to pale ochraceous, more intense on abdomen and under tail-coverts (wear and fading alters the colour of upperparts to considerably duller, and underparts to paler); iris brown; bill blackish; mandible grey; feet grey. Male wing 69 mm, tail 65 mm, culmen 17 mm, tarsus 24 mm. Female wing 62 mm.

RANGE Eurasia to Australia; in New Guinea, recorded from only a few widely separated large marshes.

SUBSPECIES IN NEW GUINEA One, *sumbae* (Hartert); which also lives in Australia (Queensland), Solomon Islands and Moluccas. (*A. a. australis* is an Australian race.)

NESTING A cup-shaped nest attached to upright tall grass stems in an extensive swamp [eggs three to four, greyish, spotted with brown. Australian data].

REMARKS On the Fly River lagoons, the reed warbler was common in the clumps of reeds which rose ten feet or more out of the water. There the males sang, sitting up straight on reed stems, and fed low among the reeds.

***Megalurus timoriensis* (Wallace)**

Rufous-capped Grass Warbler. Length 7–9 in. Adults: crown rufous (streaked with blackish in one subspecies); upper back, streaked with black and tan or reddish brown; upper wing-coverts and outer edges of remiges light brown to reddish brown; rump uniform tan-brown to reddish brown; rectrices brown; underparts whitish to greyish with flanks buffy to ochraceous to greyish (may be streaked); iris light brown; bill brownish black, mandible paler; feet pinkish. Male wing 64–79 mm (subspecies). Female: somewhat smaller (size varies with subspecies); subspecies vary in streaking in flanks; general tone of upper and underparts, streaking on crown, length of wing and tail.

RANGE Philippines to Australian area; common in grasslands from sea level to 13,000 ft.

SUBSPECIES IN NEW GUINEA Eight, some rather poorly defined:

a) *macrurus* (Salvadori); south-eastern New Guinea, in lowlands up to 6,500 ft (west in south to Hall Sound and in north to Herzog Mountains), also in mid-mountain valleys of Snow Mountains, from 3,800 to 8,000 ft. Male wing 69 mm, tail 100 mm, tarsus 29 mm, culmen 17 mm; female wing 63 mm.
b) *alpinus* (Mayr and Rand); in alpine grasslands, 9,000 to 12,000 ft, of south-eastern New Guinea (Wharton Range), to Snow Mountains, 10,000 to 13,000 ft; like *macrurus* but larger; male wing 73–79 mm, tail 91–112 mm; flanks greyer and with shaft streaks; upperparts darker and more heavily streaked.
c) *wahgiensis* (Mayr and Gilliard); Central Highlands in mid-mountain grasslands (7,800 ft); like *alpinus* but upperparts brighter, more reddish, less tan; underparts whiter; tail longer; male wing 70 mm, tail 97–119 mm.
d) *montanus* (Mayr and Gilliard); Central Highlands in alpine grassland at 12,000 ft (Mt Hagen); like *alpinus* and *wahgiensis* but brown parts of upperparts much darker and sides of neck darker; male wing 74 mm, tail 101 mm.
e) *harterti* (Mayr); Huon Peninsula in mid-mountain and alpine grasslands (2,500 to 5,500 and 9,000 to 12,000 ft); like *macrurus* but upperparts and flanks much darker.
f) *mayri* (Hartert); north New Guinea in lowland grasslands (Humboldt Bay to Astrolabe Bay); very similar to *macrurus*.
g) *stresemanni* (Hartert); Arfak Mountains in mid-mountain grassland

(6,000 ft); like *macrurus* but with heavier wash of ochraceous on flanks.

h) *muscalis* (Rand); south New Guinea in lowlands of mid-Fly River; the smallest race, much like *macrurus* but with pronounced streaking in crown; wing 64 mm.

NESTING [In a tussock of grass; nest a deep cup of grass lined with feathers; eggs three, white, spotted; size 20 × 15 mm. Australian data.]

REMARKS This is a bird found in denser areas of grass in which it skulks and feeds. Sometimes it is very shy and retiring, but at other times it may mount to the top of shrub or grass stems and scold. When alarmed, it may go flying over the grass tops for some distance. Its song of loud, full notes repeated at intervals is usually given from the top of tussock or low shrub, but occasionally a flight song is given. The bird rises thirty feet or so, gives its short song, then sinks back into the grass. Though insects are the main food of the species, some grass seeds and sedge seeds are eaten, at least by the birds that live under alpine conditions.

***Megalurus albolimbatus* (D'Albertis and Salvadori)**

Fly River Grass Warbler. Length 5½–6 in. Adults: crown, rump and upper tail-coverts uniform cinnamon-rufous; feathers of back similar but with broad black centres giving a streaked pattern there; inner secondaries black broadly edged with white on both webs; rest of remiges black edged externally with pale brown; wing-coverts black edged with rufous buff; rectrices dusky brown edged with dull rufous; lores and eyebrow line buffy white; ear-coverts buffy grey; cheeks, throat and underparts of body white with a buffy wash on breast and fulvous on flanks and under tail-coverts; iris brown; bill brown, mandible paler; feet pinkish brown. Male wing 60 mm, tail 60 mm, culmen 16 mm, tarsus 23 mm. Female wing 55 mm.

RANGE South New Guinea in middle Fly River area.

NESTING A globular structure with an opening on the side near top; composed of grasses; placed in grass stands in marshes on edges of lagoon; eggs three, pinkish white, heavily marked with small marks and specks of pinkish brown; size 19 × 14 mm.

REMARKS This grass warbler was discovered in 1877, and next seen by an Archbold expedition in 1936, near the same place. In one small area where clumps of reeds and masses of floating rice grass on the edge of the lagoon were growing in one to two fathoms of water, this bird was common. We found it nowhere else. It was a secretive bird, keeping low in the dense vegetation where it crept about, only rarely venturing

into the more open stands of reeds or among the nearby lotus lilies. When disturbed, the bird sometimes gave a little rattling, scolding call, and when startled into flight by the close approach of our canoe, it flew but a short distance to perch on the top of a clump of vegetation.

***Megalurus gramineus* (Gould)**

Little Grass Warbler. Length 5½–6 in. Adults: crown and back brown, streaked black, rump more uniform; rectrices brown edged with ashy brown, inner secondaries black edged with grey; eyebrow stripe white; cheeks and ear-coverts white mottled dusky; underparts white with flanks and under tail-coverts rufescent and both streaked with dark brown (Australian specimens have black streaks on breast, said to be lacking in the only known New Guinea specimen); iris brown; bill light brown; feet brown. Male wing 61 mm, tail 67 mm, culmen 11 mm, tarsus 19 mm. Female wing 56 mm.

RANGE Western and southern Australia; also one New Guinea record from Wissel Lake area (Paniai).

SUBSPECIES IN NEW GUINEA One, *papuensis* (Junge).

NESTING [A deep cup of grass placed in a clump of reeds growing in water; eggs three, white, spotted with reddish; size 18 × 14 mm. Australian data.]

REMARKS In Australia, this is a bird found in marshes and the margins of coastal estuaries. It seemed to be a shy, retiring species of grass and reed, and difficult to observe.

***Cisticola exilis* (Vigors and Horsfield)**

Fantail Warbler. Length 3½–4½ in. Adults: upperparts variegated; back buff and light brown streaked with black except for uniform reddish rump; top of head like back except in breeding male, when it is uniform pale reddish brown; underparts whitish washed with buff especially on flanks and breast; tail below grey with black subterminal spots and terminal pale tip (this species has two moults a year, especially noticeable in the tail and in the top of the head in the male); iris brown; bill dark brown; feet yellowish brown. Male wing 47 mm, tail 33 mm (summer) 50 mm (winter), culmen 12 mm, tarsus 18 mm. Female wing 43 mm.

RANGE Australia to India. In New Guinea, in lowlands and mid-mountain grasslands of the eastern part of the island, west in north to Humboldt Bay and Snow Mountains, in south to Fly and Oriomo Rivers, up to 5,000 ft. Also on islands in Torres Straits and on Fergusson, Goodenough, and Vulcan Islands.

SUBSPECIES IN NEW GUINEA One, *diminuta* (Mathews); also in north-eastern Australia.

NESTING About a foot above the ground in edge of a patch of tall grass; semi-pensile nest an oval with opening at side near top and attached all around to the grass stems; nest of rather neat, dainty construction of plant down with a few dead grass blades or other herbaceous leaves worked into the outside, the whole bound together with animal silk. Eggs two, light greenish-blue well marked with spots and dots of dark earth-brown; size 14 × 11 mm.

REMARKS This is a common species found in the open grasslands, often moving about unobtrusively in the cover. In the breeding season, however, the male frequently sits up on an exposed perch some yards above the ground and gives his song, a little plaintive call followed by a loud, full, double note. A flight song has been described for the species elsewhere.

### Tree Warblers

*(Twenty-one species in New Guinea)*

The group contains five genera in New Guinea. One genus, *Phylloscopus*, which is especially rich in species in southern Asia, reaches Europe, and has close relatives in Africa. The other genera, all closely related, form part of a large Australian-New Guinea group of birds which are possibly not very closely related to the tree warblers of Asia, Europe and Africa.

The New Guinea species form the bulk of the small predominately green or olive-brown birds that glean for insects amongst the leaves, twigs, and branches of trees and undergrowth in the forest and second growth.

There are twenty-one species in the New Guinea area, and often several live in the same area. The only closely similar birds are the timaliin *Crateroscelis* (q.v.) of the undergrowth. Of course many small honeyeaters often glean amongst the foliage for insects.

### Key to Tree Warblers

Genera: *Sericornis, Acanthiza, Gerygone, Eugerygone,* and *Phylloscopus*

1 White mark on quills of folded wing: 2.
  Not so: 3.
2 Back red: *Eugerygone rubra* (male).
  Back green: *E. rubra* (female).
3 Back clear grey; lower rump feathers tipped white: *Gerygone cinerea.*
  Not so: 4.
4 Throat black: *G. palpebrosa* (male).
  Throat not black: 5.

5 Conspicuous grey superciliary from bill to nape: *Phylloscopus trivirgatus* (subspecies).
Not so: 6.

6 Throat white or grey, contrasting with yellow breast: 7.
Not so: 8.

7 Conspicuous white spots in tail tip: *G. olivacea.*
No white spots in tail tip: *G. palpebrosa* (female).

8 Crown grey; back green or grey-green: 9.
Not so: 10.

9 Flanks yellow: *G. chloronota.*
Flanks greyish olive (Numfor Island only): *P. trivirgatus maforensis.*

10 Back brown or pale grey-brown; conspicuous white spots in tail tip: 11.
Back variable; no conspicuous white spots in tail tip: 12.

11 Forehead white (lowlands south New Guinea): *G. fulva.*
Forehead brown, like back (mountains only): *G. ruficollis.*

12 Throat and breast white; abdomen yellow (whole underparts washed yellow; back green in Waigeu subspecies): *G. chrysogaster.*
Not so: 13.

13 A distinct white spot on each side of forehead: *Sericornis beccarii.*
Not so: 14.

14 Whole bill yellowish horn-colour; chin and throat heavily streaked in most subspecies: *S. spilodera.*
Upper mandible at least dark brown; no distinct streaks on throat: 15.

15 Eyelids with white or whitish feathering: *G. magnirostris.*
Eyelids not white or whitish: 16.

16 Sides of head plain greyish olive: *S. arfakianus.*
Not so: 17.

17 The following species do not key out well, and a synopsis is presented:
(a) *S. nouhuysi*; mid and high mountains; length 4½–5 in. (wing usually over 60 mm); no white or grey tips to wing-coverts; upperparts brownish olive; forehead, sides of head, and sometimes throat, rufous buff; underparts yellowish olive (one subspecies, Snow Mountains, with upperparts rufous brown, underparts pale brown); no black subterminal tail bar.
(b) *S. virgatus*; like *nouhuysi* but slightly smaller, and usually with grey to whitish tips on wing-coverts.
(c) *S. perspicillatus*; mid-mountains (but not Vogelkop); length 4 in.; side of head orange ochraceous, contrasting sharply with crown; upperparts greenish; underparts buffy, flanks more olive; subterminal black tail bar indistinct.
(d) *S. rufescens*; mid-mountains (Vogelkop only); length 3½–4 in.; side of head buffy brown; upperparts brownish olive; underparts pale ochraceous; subterminal dark tail bar distinct.

(e) *S. papuensis*; mid and high mountains; length 4–4½ in.; colour variable, upperparts greenish to brownish with feathers of forehead pale and with black tips; sides of head washed brownish; subterminal dark tail bar broad.

(f) *S. arfakianus*; mid-mountains; length 3½–4 in.; upperparts dark grey-green; underparts greenish white; sides of head grey-green; tail bar indistinct.

(g) *Acanthiza murina*; high mountains; length 3½–4 in.; upperparts brownish olive; underparts greyish white, tinged buff; feathers of forehead with black tips, and cheeks with a mixed pale and dark, fine 'freckled' pattern; subterminal dark tail band very distinct, followed by grey tip.

### *Sericornis spilodera* (Gray)

Pale-billed Sericornis. Length 4–5 in. Adult male: bill pale horn-colour throughout is diagnostic; some subspecies are quite different: upperparts greenish or dark greyish green; crown sometimes blackish to washed rufous, with rufous or buffy forehead; ear-coverts greyish olive to greyish rufous; underparts whitish to yellowish, mainland New Guinea races with throat and upper breast heavily streaked with black or dark olive; some island races with obscure or no streaking in throat; tail in some instances with indistinct subterminal black bar; iris brown; bill light horn-colour; feet light horn-colour; wing 60 mm, tail 45 mm, culmen 15 mm, tarsus 19 mm. Female: on average slightly smaller.

RANGE Lowlands and lower mountain slopes up to 3,700 ft, in New Guinea, and satellite islands of Japen, Waigeu and Aru Islands.

SUBSPECIES Six:

a) *spilodera* (Gray); Japen Island and north-western and north New Guinea (east to Astrolabe Bay); crown blackish; ear-coverts dull fuscous; back and wing-coverts dull grey-green; tail dark rufous brown; throat white with conspicuous black spots; breast obscurely streaked with grey; abdomen yellowish white, flanks more olive.

b) *guttatus* (Sharpe); south-eastern New Guinea (west in north to Huon Peninsula, in south to Aroa River); like *spilodera* but crown greenish, forehead and ear-coverts tinged brown.

c) *wuroi* (Mayr); Fly River area, south New Guinea; like *guttatus* but paler and greener above; flanks yellowish green.

d) *granti* (Hartert); Nassau Range western Snow Mountains; like *guttatus* but crown and ear-coverts browner; spotting of throat somewhat reduced, and flanks yellower.

e) *ferrugineus* (Stresemann and Paludan); Waigeu Island; quite distinct from *granti* in rufous forehead, greyish rufous ear-coverts;

much paler yellowish white underparts with spotting on throat almost obsolete and grey.

f) *aruensis* (Ogilvie-Grant); Aru Islands; crown rufous olive, forehead paler and buffy as are ear-coverts; back bright greenish olive; throat white without spots, abdomen yellowish.

REMARKS A bird found in the lower part of the forest where it gleans from the smaller branches and twigs, and also feeds out into second growth. The species is quick and active in its movements, and often gives a characteristic downward flick of its tail.

***Sericornis beccarii* (Salvadori)**

Beccari's Sericornis. Length 4–5 in. Adult male: the white supra-loral spot, and the white (once grey) tips to upper wing-coverts are diagnostic; upperparts generally brownish olive or olive; tail brown; underparts whitish (throat spotted in one subspecies) washed with yellowish on abdomen, grey on breast (with a slight streaked or mottled effect), flanks olive (or underparts heavily washed with brownish olive); alula and upper greater coverts black with distinct white tips (except for one subspecies in which the light tips are grey); supra-loral spot white; small white mark above and below eye; black area in lores present or absent; tail without a black subterminal bar; iris red-brown; bill horn-colour or dark brown, mandible paler at base; feet light horn-colour; wing 59–61 mm. Female wing 53–59 mm.

RANGE Cape York, lowlands of south New Guinea, and low altitudes in western half of north New Guinea (not in Vogelkop).

SUBSPECIES IN NEW GUINEA Six:

a) *beccarii* (Salvadori); Aru Islands; crown dark brown, many feathers edged black; back brownish olive, tail darker red-brown; blackish line surrounding conspicuous white supra-loral spot broad; white mark above and below eye conspicuous; cheeks olive-brown; throat white; breast grey; abdomen yellowish white; flanks olive; under tail-coverts rust-coloured; greater wing-coverts and alula black with conspicuous white tips. Male wing 59 mm, tail 43 mm, culmen 15 mm, tarsus 20·5 mm. Female wing 53 mm.

b) *randi* (Mayr); lower Fly River area, south New Guinea; like *beccarii* but upperparts greener; upper throat white, spotted with black; breast and belly yellow, breast with grey streaks; under tail-coverts yellowish; outer upper wing-coverts black with broad white tips.

c) *cyclopum* (Hartert); Cyclops Mountains, 2,000 to 5,000 ft; like *randi* but white supra-loral and eye spots small, blackish line surrounding white supra-loral spot narrow; throat whitish, unspotted; breast mottled grey; ear-coverts tinged cinnamon.

d) *weylandi* (Mayr); Weyland Mountains; like *cyclopum* but white supra-loral spot and white above eye larger, black area in lores larger.
e) *wondiwoi* (Mayr); Wondiwoi Mountains; like *cyclopum* but white supra-loral and eye spots small, and no black in loral area; lores and cheeks cinnamon.
f) *idenburgi* (Rand); slopes above Idenburg River, 2,700 to 3,800 ft, differs from the above in the darker, browner upperparts, the darker underparts heavily washed with brownish olive; and in wing-coverts and alula with narrow white or greyish tips. Male wing 61 mm. Female wing 59 mm.

NESTING [Nest on ground, a domed structure with side entrance of grass, etc., and lined with finer material; eggs three to four, reddish brown with darker area near larger end; size 19 × 16 mm. Australian data.]

REMARKS Beccari's sericornis is a bird found in forest shrubbery, and it sometimes mixes with parties of other small birds. It has a fine sweet song.

***Sericornis virgatus* (Reichenow)**

Perplexing Sericornis. Length 4½ in. Adult male: forehead and side of face buffy rufous or rufous in moderate contrast to crown; supra-loral area often paler buffy; upperparts greenish olive, browner on head and tail (or more brownish olive); underparts greyish buff or yellowish white, throat washed rufous in one form; upper wing-coverts and alula with or without narrow pale tips which may be white or grey; no distinct black subterminal bar in tail feathers; iris brown; bill brown to blackish; feet horn-colour; wing 58–63 mm (up to 66 mm in one race).

RANGE Arfak Mountains, Japen Island, and Sepik Mountains.

SUBSPECIES The arrangement of the following five subspecies into one species is first attempted here. Hitherto, they have been arranged in the two species *beccarii* and *nouhuysi* in various ways. I do not even hope that the present arrangement is final, but it does have the advantage of stressing the problems of species limits, and aiding identification by grouping together things which look alike. Taken together, these five subspecies seem to bridge almost completely the gap between the two species *beccarii* of the lowlands, and low mountain slopes, and the mountain *nouhuysi*! Not only latitudinal, but also altitudinal replacement seems involved.

a) *cantans* (Mayr); Arfak Mountains, above 4,000 ft; throat and breast washed with rufous, contrasting with the greyish buff abdomen; under tail-coverts rufous; forehead lores, and area around eye

strongly washed rufous; tail and crown conspicuously washed rufous; pale tips on alula greater and median wing-coverts narrow and buffy grey. Male wing 62 mm, tail 44 mm, culmen 16 mm, tarsus 21 mm. Female wing 59 mm.

b) *imitator* (Mayr); Arfak Mountains, 2,500 to 4,000 ft; like *cantans* but throat whitish in clear contrast with cinnamon-buffy side of head; breast washed with greyish olivaceous; middle of abdomen yellowish white; under tail-coverts olivaceous; back greenish; alula and greater and median wing-coverts darker than rest of wing, and with narrow, white tips. Male wing 62 mm, tail 45 mm, culmen 16 mm, tarsus 21 mm. Female wing 57 mm.

c) *jobiensis* (Stresemann and Paludan); Japen Island, Geelvink Bay; like *imitator* but forehead and face darker, more ochraceous cinnamon; upperparts darker, more dark green, less olive; underparts paler.

d) *virgatus* (Reichenow); Maeanderburg, middle Sepik area, 2,000 ft; like *jobiensis* but more brownish throughout, especially on wings and head; underparts paler, forehead, lores and sides of head rufous, paler in supra-loral area. Male wing 59 mm. Female wing 56 mm.

e) *pontifex* (Stresemann); middle Sepik area, 3,200 to 5,000 ft; differs from the above in being more brownish and upper wing-coverts without well defined white tips; pale tips to upper wing-coverts indistinct greenish grey or absent. Male wing 59–66 mm. Female wing 56 mm.

REMARKS This is a most puzzling collection of subspecies that merits further study.

### *Sericornis nouhuysi* (Van Oort)

Large Mountain Sericornis. Length 4½–5 in. Adults: subspecies very different, ranging from a form which is brownish olive above; forehead, rufous buff; yellowish olive below with rufous buff on sides of head and on throat; to a form which is rufous brown above; forehead, sides of head and throat rufous buff, and rest of underparts pale brown. The rufous buff forehead, throat and side of the head, the lack of black subterminal bars in the tail, and the upper wing-coverts with faint buffy (not white or grey), or no light edgings, along with the size, are the main species characters to separate this species from its near relatives. Iris brown to blood-red; bill black or brownish black; feet pale brown. Male wing 61–72 mm, tail 44–55 mm, culmen 16–18 mm, tarsus 22–25 mm. Female wing 60–65 mm.

In the Snow Mountains, there is a pronounced increase in size with increase in altitude: lowest altitude males have wing 61–67 mm; highest altitude ones 64–70 mm.

RANGE Mountains of central and eastern New Guinea, from 4,000 to 11,500 ft.

SUBSPECIES Four:

a) *nouhuysi* (van Oort); Weyland and Snow Mountains; forehead bright buffy rufous; rest of upperparts rufous brown, more rufous on rump and on edges of wing feathers; tail dark rufous brown (without dark subterminal bar); forehead, side of head and chin bright rufous buff; breast and abdomen pale brown with a greyish olive wash; under tail-coverts rufous; upper wing-coverts dark brown with obscure buffy rufous tips and edges; primary coverts blackish brown.

b) *stresemanni* (Mayr); Hindenburg Mountains to eastern Sepik Mountains and Central Highlands; intermediate between *nouhuysi* and *oorti*; underparts rather like *oorti*, but back, sides of head, and throat more rufous.

c) *oorti* (Rothschild and Hartert); mountains of south-east New Guinea, 4,000 to 9,000 ft; forehead buffy rufous; rest of upperparts brownish olive, more brown on head, and tail and wings, more olive on back; forehead, sides of head and chin buffy rufous; rest of underparts yellowish olive, more olive on flanks; under tail-coverts rufous; upper wing-coverts without light tips; male wing, on average 65 mm.

d) *monticola* (Mayr and Rand); at the highest altitudes in south-eastern New Guinea, 10,000 to 11,000 ft; like *oorti* but larger and with paler underparts; wing, on average 69 mm.

NESTING The nest is made among the leaves of a low pandanus in the forest, six feet above the ground; it is a bulky, untidy oval structure with an entrance on the side near the top. Externally it is composed of a thin layer of liverworts, some filmy fern and half-rotted fibre, this layer is thicker below the nest and forms its foundation; inside this is a compact shell, the lower two-thirds a cup-shaped layer of weathered dry pandanus leaves, the upper third of rootlets; the lining is of fine fibres and some feathers in the bottom two-thirds of the cavity. Eggs two, whitish with a pale purplish brown wash, marked with dark brown; size 34 × 16 mm.

REMARKS This is a common bird which is typical of the low shrubbery of the forest, but it also mounts into the middle spaces, and is often found in the masses of trailing bamboo. It is usually seen in parties of four or five individuals, gleaning for insects from twigs, leaves and trunks of saplings and shrubs. Occasionally, one hops up a vertical trunk of a sapling, and occasionally, a bird may utter a short, rattling call of alarm.

***Sericornis perspicillatus* (Salvadori)**

Buff-faced Sericornis. Length 4 in. Adults: forehead and crown greyish green; rest of upperparts olive-green, more brownish olive on rump; tail like rump, but with a black subterminal bar on inner web of all but the central tail feathers; wing feathers olivaceous, paler than back; side of head buffy ochraceous, which, with yellowish buff eye-ring, contrasts conspicuously with rest of plumage; underparts buffy to pale ochraceous washed with olive on sides of breast and flanks; iris brown; bill black with base of mandible whitish; feet pale brownish grey. Male wing 54 mm, tail 39 mm, culmen 13 mm, tarsus 18 mm. Female wing 52 mm.

RANGE Mountains of south-east New Guinea, Saruwaged, Central Highlands, Sepik area, Snow and Weyland Mountains; from 3,500 to 9,000 ft.

NESTING A pendant structure with an entrance on the side, and overhung with a small 'porch roof'. The nest seen was attached by a few strands to the branch of a shrub some three feet up, in a forest clearing. The nest is a bulky, untidy structure of moss, fine rootlets and bamboo leaves, lined with fine grass and roots, and with an inner lining of feathers. Both adults fed the young, making sixteen journeys in one hour. Food brought included a crane fly, moths and caterpillars; and nest sanitation occurred three times. (Loke Wan Tho.)

REMARKS Easily recognized by its bright face, this forest species is common. It goes about in little parties of four or five birds, more often in the substage, but sometimes high in the trees, sometimes low among the saplings, and also out into second growth. The birds are continually active, hopping about on twigs and stems and flitting from perch to perch, always searching for their small insect prey.

***Sericornis rufescens* (Salvadori)**

Arfak Buff-faced Sericornis. Length 3½–4 in. Adults: whole upperparts brownish olivaceous, warmer on rump; paler and more buffy on foremost part of forehead; side of head, eye-ring, and lores buff with a brownish tinge, ear-coverts darker; underparts pale ochraceous, paler, almost white on belly; wing feathers with edgings slightly more greenish than back, edges of outer primaries paler; tail olive-brown, with black subterminal bar on inner web of all but central pair of tail feathers; iris brown; bill black with base of mandible pale; feet whitish brown. Male wing 54 mm, tail 39 mm, culmen 13·5 mm, tarsus 18·5 mm; weight 8·5 grams. Female wing 51 mm.

RANGE Arfak Mountains, 5,000 to 6,000 ft.

REMARKS The bird is closely related to *S. perspicillatus*; this may prove that the Vogelkop form is actually a geographical representative of, and conspecific with, the bright-faced warbler of the mountains of the rest of New Guinea.

***Sericornis papuensis* (De Vis)**

Papuan Sericornis. Length 4–4½ in. Adults: upperparts variable from greenish olive to olive-brown, but forehead always contrasting buffy ochraceous, the feathers with dark tips; sides of head dull brown, shading into colour of crown (not contrasting with it); eye-ring buffy ochraceous to ochraceous; underparts pale ochraceous to whitish tinged yellow ochraceous, more olive along sides; tail brown with distinct subterminal black bar on inner webs of all but central pair of tail feathers; edgings of wing little paler than back; iris brown; bill brown to black; feet greyish brown. Male wing 55–61 mm, tail 38–44 mm, culmen 13·5–15 mm, tarsus 20–21 mm. Immature birds: much greener. In the Snow Mountains, birds from higher altitudes are slightly larger: at 5,500 ft, wing 58 mm; at 11,500 ft, 61 mm.

RANGE Mountains of south-eastern New Guinea, Central Highlands, Snow and Weyland Mountains; 5,500 to 11,500 ft.

SUBSPECIES Three:

a) *papuensis* (De Vis); mountains of south-eastern New Guinea.
b) *bürgersi* (Stresemann); Central Highlands, Sepik area mountains, eastern Snow Mountains; most like the browner examples of *papuensis*, but differs in the much more brownish ochraceous underparts, and the darker, more brownish upperparts.
c) *meeki* (Rothschild and Hartert); western Snow Mountains and Weyland Mountains(?); an unsatisfactory race: upperparts green above like greenest *papuensis*, but underparts with throat with a more distinct rufous wash, and abdomen darker olive.

REMARKS This common species is found up to the timber line. Sometimes it gleans actively for its insect food among the twigs of the forest undergrowth, and sometimes it finds food well up in the trees. It often forms small parties of its own kind.

***Sericornis arfakianus* (Salvadori)**

Grey-green Sericornis. Length 3½–4 in. Adults: upperparts dark grey-green, more olive on rump; wings greenish, edgings of primaries with a brownish tinge; tail brownish olive, subterminal bar on inner webs of tail feathers only indicated; sides of head greyish green; underparts yellowish white, greyer on breast, and more olive on flanks; in one subspecies, underparts have faint greyish olive streaks; iris brown; bill

brownish black; feet light grey-brown. Male wing 54 mm, tail 40 mm, culmen 14 mm, tarsus 19 mm. Female wing 50 mm.

RANGE Mountains of New Guinea, 2,200 to 5,300 ft.

SUBSPECIES Two:

a) *arfakianus* (Salvadori); Vogelkop to western Snow Mountains; underparts yellowish white without streaks.
b) *olivaceus* (Salvadori); eastern Snow Mountains, Cyclop, Sepik, Saruwaged, and south-eastern New Guinea mountains.

REMARKS This dull green species lives in the lower parts of the mountains, where it seems only fairly common. It was found singly, low in the forest, gleaning among the twigs and leaves.

### *Acanthiza murina* (De Vis)

DeVis Tree Warbler. Length 3½–4 in. Adults: upperparts brownish olive; underparts greyish white tinged buffy, more olive-grey on flanks and whiter on abdomen; feathers of forehead with dark tips and pale bases, and feathers of cheeks with pale stripes giving a 'grizzled' pattern; tail with broad black subterminal band and grey tip; iris whitish; bill brown or black with pale base to mandible; feet black. Wing 62 mm, tail 38 mm, culmen 13 mm, tarsus 19 mm. High altitude birds may be on average rather larger. The bill is fine, and rictal bristles inconspicuous.

RANGE Mountains of south-east New Guinea, and Central Highlands to Snow Mountains, from 7,500 to 11,500 ft.

NESTING This is a domed structure with the entrance on one side, placed in a forest tree; two young (Loke Wan Tho).

REMARKS This species is the commonest warbler found in the forest at the highest altitudes. It is an active bird with quick movements; it usually fed among the leaves and twigs of the upper parts of the trees, but also came into the brush at the forest edge. It often moved about and fed in small parties of five or six of its own kind, and was sometimes associated with *Sericornis nouhuysi*, though the latter usually fed lower down in the forest.

### *Gerygone cinerea* (Salvadori)

Grey Gerygone Warbler. Length 3½ in. Adults: upperparts clear grey, feathers of lower rump tipped with white; underparts white, faintly clouded with grey on breast and flanks; tail with subterminal black band; iris brown; bill greyish black; feet greyish black. Wing 53 mm, tail 34 mm, culmen 12 mm, tarsus 18 mm. The bill is moderately fine and the rictal bristles are of moderate size.

RANGE Mountains of Arfak, Snow Mountains to Central Highlands, and south-eastern New Guinea; from 3,200 (more often 6,000) to 9,000 ft.

REMARKS On Mt Tafa, this grey warbler was the only common warbler that habitually frequented the upper part of the forest. It was usually seen in small parties of its own kind, actively gleaning for insects well up in the trees.

***Gerygone chrysogaster* (Gray)**

Yellow-bellied Gerygone Warbler. Length 4 in. Adults: upperparts brownish olive to greenish olive; eye-ring whitish or buffy; cheeks greyish olive to brownish; throat and breast white, sharply set off from pale yellow abdomen or (in a subspecies) underparts white washed throughout with pale yellow, more heavily on flanks and abdomen; wing-coverts like back or (in a subspecies) with conspicuous yellowish white edges; indistinct black subterminal bar in tail present or absent; iris red-brown; bill black or (in a subspecies) horn-colour; feet pale horn-colour. Wing 56 mm, tail 42 mm, culmen 14 mm, tarsus 18 mm. Compared to other members of the genus, the bill is fairly broad and the rictal bristles are conspicuous. Specimens become browner with age in collections.

RANGE New Guinea lowlands, Aru Islands, and Japen, Misol, Batanta and Waigeu Islands; sea level to 500 ft, occasionally 2,500 ft.

SUBSPECIES Five:

a) *chrysogaster* (Gray); Aru Islands, southern and eastern New Guinea (west in south to Mimika River, in north to Mamberamo River); Japen Island; upperparts brownish olive; eye-ring whitish; cheeks greyish olive; throat and breast white; abdomen pale yellow; no pale edging on wing-coverts; lower mandible black.
b) *leucothorax* (Mayr); head of Geelvink Bay; intermediate between *chrysogaster* and *dohertyi*.
c) *dohertyi* (Rothschild and Hartert); south-west New Guinea (Triton Bay to Onin Peninsula); like *chrysogaster* but upperparts greener, eye-ring buffy, cheeks browner; faint pale margins to some upper wing-coverts; abdomen paler yellow; lower mandible horn-brown, paler at base.
d) *notata* (Salvadori); Misol, Batanta and Vogelkop; like *dohertyi* but with conspicuous yellowish white margins to middle and greater wing-coverts; bill horn-colour, mandible paler.
e) *neglecta* (Wallace); Waigeu Island; like *dohertyi* but whole underparts whitish washed with pale yellow.

NESTING An oval, pensile, rather neat structure with a short-downward

bent spout from the side entrance. A short 'rope' of many strands of nest material attached the nest to the tip of a branch about ten feet up in the rain forest and it hung quite unconcealed. The nest was composed externally of weathered plant fibres and animal silk; inside, it was lined with fine soft fibres. Three young in one nest, with short white down still attached to back feathers and white tufts of down, about 8 mm long, present on each side of nape.

REMARKS The yellow-bellied gerygone is fairly common in forest and second growth.

***Gerygone chloronota* (Gould)**

Grey-headed Gerygone Warbler. Length 3–3½ in. Adults: top of head, nape, and cheeks grey, sharply contrasting with green of back and white of throat; back to upper tail-coverts, upper wing-coverts, and outer margins of secondaries, rather clear green; tail dusky with obscure black subterminal band; underparts white, slightly tinged grey on breast and strongly washed with yellow on flanks; iris scarlet or red-brown; bill black; feet bluish black. Wing 53 mm, tail 35 mm, culmen 13 mm, tarsus 17 mm. The bill is rather broad at the base, and rictal bristles moderate.

RANGE North-west Australia and locally in lowlands of New Guinea, also Waigeu and Aru Islands; sea level to 4,800 ft.

SUBSPECIES IN NEW GUINEA Two very similar ones:
a) *cinereiceps* (Sharpe); New Guinea.
b) *aruensis* (Buttikofer); Aru Islands and Waigeu Island.

NESTING [A domed structure with a side entrance, placed in a tree; eggs two to three, white, plentifully marked with reddish brown; size 17 × 12 mm. Australian data.]

REMARKS Though one of the less common members of the genus, this species seems to be widespread in the lowlands; gleaning among the leaves and twigs of forest trees, and more commonly in low trees and shrubbery of the forest edges.

***Gerygone palpebrosa* (Wallace)**

Black-headed Gerygone Warbler. Length 4 in. Adult male: forehead black with a white spot on each side; crown and nape olive or (as in one subspecies) black; rest of upperparts olive or olive-green; indistinct black subterminal band in tail; side of head black; chin, throat and upper back black with a conspicuous white patch on each malar region; lower breast and abdomen yellow, more olive on flanks; iris red-brown; bill black; feet greyish black; wing 56 mm, tail 37 mm, culmen 13 mm,

tarsus 18 mm. Female: upperparts olive-green; chin and upper throat white; rest of underparts bright to (in one subspecies) pale yellow. Culmen fairly broad at base; rictal bristles moderate.

RANGE North-eastern Australia (Cape York southward), Aru Islands, lowlands of New Guinea and Japen Island, and western Papuan Islands; lowlands to 4,800 ft.

SUBSPECIES IN NEW GUINEA Four:

a) *wahnesi* (Meyer); Japen Island and all northern New Guinea (Weyland Mountains to Hydrographers Mountains); crown, nape and side of head all black.
b) *inconspicua* (Ramsay); south-eastern New Guinea to east bank of Fly River; like *wahnesi* but with crown and nape olive like back.
c) *palpebrosa* (Wallace); Aru Islands, western Papuan Islands, and north-western New Guinea (intergrading with *inconspicua* on south slope of Snow Mountains); like *inconspicua* but green of upperparts brighter yellowish green.
d) *tarara* (Rand); south New Guinea between Morehead River and mouth of Fly River; like *inconspicua* but black of throat and head distinctly brownish tinged.

NESTING [An oval, pensile structure with a side entrance; hung from a branch; eggs two, white, heavily covered with purplish brown; size 17 × 13 mm. The young are said to have 'four peculiar head plumes' (presumably of natal down, similar to those of some others in the genus). Australian data.]

REMARKS This is a bird of the forest and second growth, which gleans for insects in the lower treetops and the taller shrubbery. The species was often seen in little parties, or as part of a mixed feeding flock of the forest.

### *Gerygone magnirostris* (Gould)

Swamp Gerygone Warbler. Length 4 in. Adults: upperparts olive-brown, more brown or more green depending on the subspecies; underparts whitish, washed on breast and flanks with brownish, buffy, or yellowish buffy in varying intensity depending on the subspecies; indistinct subterminal dark brown band on tail; small, white supraloral spot evident or obscure; narrow, white eye-ring broken in front and behind; iris dark red; bill brownish black; feet brown to slate. Wing 56 (53–57) mm, tail 40 mm, culmen 13 mm, tarsus 17 mm. The bill is moderately heavy, but the rictal bristles are short.

RANGE Northern Australia and New Guinea lowlands and satellite islands; near sea level.

SUBSPECIES IN NEW GUINEA AREA Ten, differing chiefly in tone of back, and in amount and tone of wash on underparts.

On the main island:

a) *mimikae* (Ogilvie-Grant); south-eastern and southern New Guinea, west in the south to Onin Peninsula.
b) *conspicillata* (Gray); Vogelkop.
c) *affinis* (Meyer); north New Guinea from Geelvink Bay to Collingwood Bay, also Japen, Vulcan and Dampier Island.

On satellite islands only:

d) *brunneipectus* (Sharpe); Aru Islands.
e) *cobana* (Mathews); western Papuan Islands of Waigeu, Batanta, and Salawati.
f) *occasa* (Ripley); western Papuan Island of Kofian.
g) *hypoxantha* (Salvadori); Biak Island, Geelvink Bay.
h) *proxima* (Rothschild and Hartert); Fergusson and Goodenough Islands, D'Entrecasteaux Archipelago.
i) *onerosa* (Hartert); Misima (St Aignan) Island.
j) *tagulana* (Rothschild and Hartert); Tagula (Sudest) Island.
k) *rosseliana* (Hartert); Rossel Island.

NESTING Attached to the end of a branch of a low tree, often overhanging water and five to fifteen feet up. The nest is an oval, pensile structure with an entrance at the side, and is entered through a short spout. Frequently, considerable material is draped over the supporting branch to trail down to the nest giving the appearance of a long (up to three feet), loose trail of vegetation, with the actual nest in the lower end. Much of the nest is made of a wide variety of vegetable matter, rootlets, shredded bark, leaves, etc., with a lining of vegetable down. Eggs two or three; pinkish white, marked with brown forming a wreath around larger end; size 17 × 12 mm. Cuckoos' (*Chalcites*) eggs were found in three of six nests with eggs. The young have blackish skin with long (up to 8 mm) tufts of white down over each eye, on nape, and back. The female alone builds the nest with the male in attendance; both sexes feed the young.

REMARKS The favourite habitat of this bird is low, densely-leaved stands of trees fringing or growing in water, i.e., in mangrove swamp, freshwater swamp or river edge, sometimes in bamboos, and in mango trees in villages. The species is sometimes very common. The bird, singly or in pairs, or rarely in parties of four or five, gleans actively for its insect food among twigs and branches. The male has a pleasing little song of two syllables, repeated over and over, and when displaying to the female it may spread its tail widely showing the pattern of the subterminal band.

***Gerygone fusca* (Gould)**

Western Gerygone Warbler. Length 3½–4 in. Adults: upperparts rather light greyish brown with a narrow white forehead which continues as a white line over the black lores to above the eye, with a broad subterminal black band in the tail, and conspicuous white spots on the inner web near the tip of all but the central pair of tail feathers; ear-coverts grey; underparts white, tinged greyish on the sides of breast, and buffy on flanks; iris red-brown; bill black; feet black. Wing 60 mm, tail 43 mm, culmen 13 mm, tarsus 17 mm.

RANGE Australia and southern New Guinea in lowlands.

SUBSPECIES IN NEW GUINEA One, *pallida* (Finsch); known from only three localities; Triton Bay, Mimika River, and Daru, and a single specimen from each.

NESTING [A domed, pensile structure in a sapling or low tree; eggs two or three, pinkish white, spotted, especially at larger end, with reddish brown; size 16 × 11·5 mm. Australian data.]

REMARKS Superficially, this rare bird is very similar to the common swamp gerygone, but the white line from forehead to over eye should be noted, and also the white spots in the tip of the tail.

***Gerygone ruficollis* (Salvadori)**

Treefern Gerygone Warbler. Length 3½–4 in. Adults: upperparts brown, paler on rump, darker on crown; side of head brown like back, but eyelid feathering white; wing quills black contrasting with back, the inner quills edged with grey on outer web; tail black contrasting with back, and with conspicuous white subterminal spots; underparts white except for sides of breast which are brown, sometimes with a brownish wash on flanks and a rusty wash across breast and throat; iris red-brown; bill black; feet black. Wing 59 mm, tail 44 mm, culmen 13 mm, tarsus 18 mm. Wear causes considerable changes in the brown of the back, giving it a sandy tone.

RANGE Higher mountains of New Guinea, 5,000 to 11,000 ft.

SUBSPECIES Two very similar ones:

a) *rificollis* (Salvadori); Arfak.
b) *insperata* (De Vis); Snow Mountains, Central Highlands, Huon Peninsula, and mountains of south-eastern New Guinea.

REMARKS In the mountains of south-east New Guinea, this warbler was a fairly common bird in the grassy, tree-fern dotted country above the timber line. There, sometimes singly, but more often in small parties, it gleaned for insects among the fronds of the tree-ferns, and through the

occasional isolated shrubs. Its song was thin and wiry with occasional fuller notes. In the Snow Mountains, it was common in the open forest at the timber line and was especially common in the mid-mountain valleys at 5,000 to 6,000 ft. In both the Snow Mountains and the Central Highlands it was found in the groves of casuarinas which stood in the farming country. It was one of the few tree birds in this habitat.

***Gerygone olivacea* (Gould)**

White-throated Gerygone Warbler. Length 3½–4 in. Adults: upperparts rather pale grey with an olive tinge; wing feathers edged with pale grey; tail with a broad black subterminal band and terminal white spots, largest on outer tail feathers; sides of head brownish grey with an obscure whitish supra-loral spot; chin and upper throat white, contrasting with the bright yellow of the rest of the underparts; under tail-coverts yellowish white; iris red; bill black; feet slate. Wing 57 mm, tail 37 mm, culmen 12 mm, tarsus 17 mm.

RANGE Northern and eastern Australia and south-eastern New Guinea in the lowlands.

SUBSPECIES IN NEW GUINEA One, *cinerascens* (Sharpe); which is known only from the Port Moresby and the nearby Aroa River area.

NESTING [A pendant, domed structure attached to a branch of a tree; eggs three, pinkish white with spots and blotches of reddish brown; size 17·5 × 14·5 mm. Australian data.]

REMARKS Mr John T. Zimmer, one of the very few people to find this species in New Guinea, reported that he secured it in the savannah country near Port Moresby.

***Eugerygone rubra* (Sharpe)**

Red-backed Warbler. Length 4–4½ in. Adult male: crown, hind neck, back, rump and upper tail-coverts dark red; wings black with a white spot on outer web of secondaries and inner primaries giving a white mark on the folded wing; tail black, the outer feathers with broad white tip; throat and abdomen whitish; breast and flanks grey; under wing greyish black with most of under wing-coverts white, and a white bar across central portion of flight feathers; iris brown; bill black with mandible red; feet yellowish brown; wing 59 mm, tail 50 mm, culmen 14 mm, tarsus 18 mm. Adult female: similar to male, but red of upperparts replaced by olive-green, and forehead white. Immature: upperparts dark cinnamon-brown; underparts pale cinnamon-brown. The tail in this species is much graduated.

RANGE Mountain forests of New Guinea, 5,000 to 12,000 ft.

SUBSPECIES Two:

a) *rubra* (Sharpe); Arfak Mountains; an olive wash on grey of underparts.

b) *saturatior* (Mayr); Weyland and Snow Mountains, Saruwaged Mountains, and mountains of south-east New Guinea; like *rubra* but upperparts brighter and more intensely coloured; no olive wash below.

REMARKS The red-backed warbler is a rare to uncommon bird, usually found alone, gleaning actively for its small insect food among the leaves and twigs of low substage trees and the tall undergrowth of the forests. Though often solitary, it sometimes joins the big mixed flocks of other insect-eating birds in the forest.

***Phylloscopus trivirgatus* (Strickland)**

Leaf Warbler. Length 3½–4 in. Adults of main island forms only [for Biak and Numfor races, see subspecies *maforensis* and *misoriensis*]: upperparts olive-green (dark to light), with crown variable, dark olive to black, with or without a median grey or yellow stripe; faint wing bars present or absent; grey line from bill over eye to nape; ear-coverts grey; underparts yellow with chin and upper throat paler, or grey or white; iris brown; bill black, mandible black or yellow; feet dark grey. Wing 57 mm, tail 43 mm, culmen 13 mm, tarsus 18 mm.

RANGE Malayan and Philippine Islands to New Guinea and Solomon Islands; in New Guinea from 2,500 to 7,500 ft.

SUBSPECIES IN NEW GUINEA Eight:

Five on main island:

a) *poliocephala* (Salvadori); mountains of Vogelkop and Wandammen Mountains; crown blackish olive, without median stripe.

b) *albigularis* (Hartert and Paludan); Weyland Mountains; dark crown with a median pale streak; chin, throat, and side of head white.

c) *paniaiae* (Junge); Wissel Lake area; like *albigularis* but throat and side of head grey tinged yellow.

d) *giulianettii* (Salvadori); Snow Mountains, Central Highlands, Saruwaged Mountains, and mountains of south-eastern New Guinea; like *paniaiae* but upperparts less brownish olive, more greenish.

e) *cyclopum* (Hartert); Cyclops Mountains; like *giulianettii* but upperparts brighter and more yellowish green; median line on crown yellower.

Three on satellite islands:

f) *hamlini* (Mayr and Rand); Goodenough Island; like *giulianettii* but sides of crown much blacker.

g) *maforensis* (Meyer); Numfor Island, Geelvink Bay; very different from other races: top of head and neck grey with no median crown stripe; back greyish olive; pale tips to greater wing-coverts yellow, forming a rather distinct wing bar; sides of head grey with indistinct, short eyebrow stripe; breast grey, flanks olive, throat and abdomen white, the whole washed with very pale yellow.

h) *misoriensis* (Meise); Biak Island, Geelvink Bay; upperparts dark olive-green, duller on head; median and greater wing-coverts with yellowish tips giving two indistinct wing bars; cheeks and throat yellow, rest of underparts olive-green, greyer on sides, yellower on centre of body.

NESTING The nest is a domed structure concealed in the moss of a sloping mossy bank in a forest glade, as though in a tunnel, with the cavity excavated in the moss; cavity lined with moss; eggs two, white; size 16 × 12 mm.

REMARKS A mountain bird which feeds in the treetops and the substage trees of the forest, and out into the second growth trees and shrubs. It gleans among the leaves and twigs.

## Family Muscicapidae *Flycatchers*

This is a large Old World group of insect-eating birds, especially rich in species in Africa, southern Asia and the Australia region. The New Guinea representatives are best discussed under two headings: (a) typical flycatchers, and (b) thicket flycatchers.

a) TYPICAL FLYCATCHERS There are forty-eight species of these small and fairly small flycatchers, most of which can be recognized by the flat bills, wider than high at the base. The genera, *Petroeca*, *Tregellasia* and *Poecilodryas*, placed at the end, are placed here arbitrarily and could equally well be placed with the thicket flycatchers.

Most of the birds in this group secure much of their food by darting out after flying insects or by snapping insects off twigs or leaves. These birds form a conspicuous part of the small bird fauna of the forest.

b) THICKET FLYCATCHERS This group is a connecting link between the previous group and that which follows. There are seven species. They live in the undergrowth in the forest. Some can be taken for typical flycatchers but in some the bill is not wider than high at the base and they have been put in the genus *Pachycephala* at times. In fact the division of these insect-eating birds into families is arbitrary, but the same is true of subfamilies if any other grouping is used.

### Typical Flycatchers

These birds are first divided into six artificial groups for each of which further keys to species are provided. As an alternative, a synopsis of the genera is given beyond, and a key to the species is given under each genus heading.

### Six groups of Typical Flycatchers; on colour and size

(see also keys to thicket flycatchers and to whistlers)

The keys are separated into six groups as follows:

GROUP I Upperparts partly or wholly rufous; underparts various but plumage red or yellow.

GROUP II Back grey, upperparts without rufous; breast or abdomen or both rufous to fulvous (no red or yellow in plumage).

GROUP III Upperparts conspicuously black and white, one form with rufous hind neck, two with red rumps (no yellow in plumage).

GROUP IV Plumage black except for semi-concealed white breast tufts in one species and white superciliaries in another (no rufous, yellow or red in plumage).

GROUP V Upperparts largely black, slaty or greyish, sometimes tinged brownish; underparts white, black and white, grey and white or black, grey and white; one species slaty with a red breast spot (no rufous or yellow in plumage).

GROUP VI Plumage with some yellow, bright to pale, or olive-yellow.

#### GROUP I

Upperparts partly or wholly rufous; underparts various but plumage without red or yellow.

1 Crown black: 2.
  Crown not black: 3.
2 Breast rufous: *Arses*.
  Breast white: *Monarcha alecto* (female).
3 Breast and abdomen rufous: 4.
  Breast and abdomen not rufous: 5.
4 Tail all rufous: *Monarcha rubiensis*.
  Central tail feathers black, rest rufous: *Rhipidura atra* (female).
5 Black band across throat: *Rhipidura rufifrons*.
  No black band across throat: 6.
6 Conspicuous white spots in tips of tail feathers: *Rhipidura rufidorsa*.
  Not so: *Rhipidura brachyrhyncha*.

#### GROUP II

Back grey, upperparts without rufous; breast or abdomen or both rufous to fulvous; no yellow in plumage.

1 Whole head and throat grey: *Monarcha cinerascens.*
Not so: 2.
2 Breast grey; chin and upper throat and forehead black: 3.
Not so: 4.
3 Wings and tail black, contrasting with grey back: *Monarcha frater.*
Wings and tail grey, not contrasting with back: *Monarcha melanopsis.*
4 Chin or throat with black or grey; white tips to tail feathers: 5.
Chin rufous like throat and breast or paler; no white tips to tail feathers: 6.
5 Chin black or grey; rest of throat rufous: *Monarcha trivirgatus.*
Chin white; upper throat black: *Rhipidura hyperythra.*
6 Size larger, wing to 91 mm, culmen to 19 mm: *Myiagra cyanoleuca* (female).
Size smaller, wing to 80 mm: 7.
7 Bill longer, 18 mm, and broader, 7 mm: *Myiagra ruficollis* (male, female).
Bill shorter, 16 mm, and narrower, 5 mm: *Myiagra rubecula* (female).

GROUP III

Upperparts conspicuously black and white, one subspecies with rufous hind neck, two species with red rump.

1 Rump red: 2.
Rump white: 3.
2 Size smaller, wing 105 mm or less; lowlands: *Peltops blainvillii.*
Size large, wing 106 mm or more; mountains: *Peltops montanus.*
3 Upper back and crown black: *Arses telescophthalmus.*
Upper back greyish white; crown black: *Monarchella mulleriana.*

GROUP IV

Plumage above and below black, except for white breast tufts in one species, or white superciliary in another species.

1 Plumage all shiny black: 2.
Plumage black or slaty black except for white breast tufts or eyebrow stripe: 3.
2 Length 5–5½ in.: *Myiagra atra* (male).
Length 7 in.: *Monarcha alecto* (male).
3 Semi-concealed white tuft each side of breast: *Monarcha axillaris.*
Semi-concealed white eyebrow stripe: *Rhipidura atra* (male).

GROUP V

Upperparts generally black, slaty, or greyish; sometimes tinged brownish; underparts white, black and white, grey and white or black,

grey and white; one species with a red breast spot. (No rufous or yellow in plumage.)

1 Plumage generally slaty; patch on breast red: *Petroica archboldi.*
No red in plumage: 2.

2 Underparts whitish, breast and flanks heavily streaked with fuscous: *Muscicapa griseisticta.*
Not so: 3.

3 Upperparts grey or black; chin, throat and sometimes breast solid black or dark grey; abdomen and sometimes breast white or grey: 4.
Underparts predominantly slaty with white areas or spotting on chin, side of throat, breast, or abdomen: 9.
Underparts predominantly white, at most washed with greyish on breast or with an incomplete or complete breast band: 12.

4 Back grey; throat black or grey: 5.
Back black; throat and breast black; abdomen white: 7.

5 Length 7 in.; throat black: *Poecilodryas albonotata.*
Length 5–6 in.; throat black or grey: 6.

6 White tips to outer tail feathers: *Monarcha guttula.*
No white tips to tail feathers: *Myiagra rubecula* (male).

7 Length less than 5 in.: *Petroica bivittata.*
Length 6–6½ in.: 8.
Length 7½–8 in.: *Rhipidura leucophrys.*

8 Black of breast with a U-shaped posterior margin: *Monarcha menadensis.*
Black of breast with an inverted V-shaped posterior margin: *Myiagra cyanoleuca.*

9 Breast black with white spots: 10.
Lower breast with a white patch: 11.

10 Outer tail feathers tipped white: *Rhipidura maculipectus.*
Tail feathers without white tips: *Rhipidura threnothorax.*

11 Back washed brownish: *Rhipidura leucothorax.*
Back clear slaty grey: *Rhipidura albolimbata.*

12 Underparts white with a black patch on each side of breast: *Poecilodryas hypoleuca.*
Underparts white with a distinct breast band; abdomen often tinged buffy: 13.
Not as above: 14.

13 Length 5½–6 in.: *Rhipidura fuliginosa.*
Length 6½–7 in.: *Rhipidura rufiventris.*

14 Throat and breast tinged greyish; back grey: 15.
Throat, breast and abdomen white: 16.

15 Basal half of outer tail feathers white: *Poecilodryas pulverulenta.*
Outer tail feathers wholly white: *Microeca leucophaea.*
Outer tail feathers without white: *Myiagra atra* (female).

16 Conspicuous white eyebrow stripe: *Poecilodryas brachyura.*
Side of head solid black like back: *Seisura inquieta.*

GROUP VI

Plumage with some yellow, either bright or pale or tinged olive.

1 Underparts bright yellow with olive breast band: *Poecilodryas placens.*
Underparts bright yellow with black breast patch: *Machaerirhynchus nigripectus.*
Underparts bright yellow with throat black: 2.
Not as above: 3.

2 Top of head yellow: *Monarcha chrysomela.*
Top of head black; Biak Island only: *Monarcha brehmi.*

3 Breast and throat yellow; crown wholly or partly black: 4.
Underparts with some yellow at least; no black in head; back olive: 5.

4 Lores black; ear-coverts bright yellow: *Machaerirhynchus flaviventris* (male).
Lores white; ear-coverts slaty: *Tregellasia leucops.*

5 Upper wing-coverts tipped white: *Machaerirhynchus flaviventris* (female).
Not so: 6.

6 Breast and abdomen bright or deep yellow: 7.
Breast and abdomen pale yellow or greyish yellow or dull olive-yellow: 8.

7 Bill and feet black: *Monarcha chrysomela* (female).
Bill black; feet yellow: *Microeca papuana.*

8 Crown olive like back; throat yellowish like abdomen: *Microeca flavovirescens.*
Crown grey; back olive; throat greyish white; breast pale yellow; feet yellow: *Microeca griseiceps.*
Crown olive like back; throat whitish; rest of underparts pale yellowish; feet black: *Microeca flavigaster.*

### *Synopsis* of Genera of Typical Flycatcher

PELTOPS Two species; length 7–8 in.; bill very large and longer than tarsus; wing longer than tail; contrasting pattern of black, white and red is unique; pose upright, flycatching.

RHIPIDURA Twelve species; length 5–8 in.; bill usually short and shorter than tarsus (equal in two cases); tail long, usually longer than wing (equal to wing in three cases), and much rounded; usual pose body more or less horizontal and tail raised and often spread.

SEISURA One species; length 7 in.; bill as long as tarsus; tail slightly shorter than wing; pattern, upperparts and side of head uniform black, underparts all white, is unique in family.

MONARCHA Eleven species; length 5–7½ in.; bill usually as long as or longer than tarsus (shorter in one case), and rather stout for a flycatcher; tail moderate, always considerably shorter than wing and slightly rounded or nearly square; usual pose of most species rather upright and tail not raised and not spread (*M. axillaris* an exception).

ARSES One species; length 6–6½ in.; much like *Monarcha* but with a fleshy wattle around eye, unique in family.

MYIAGRA Four species; length 5–6 in.; proportions much as in *Monarcha* but bill flatter and weaker, seen from above sides convex; pattern always simple: all black, black with a white abdomen, or back grey, breast rusty, abdomen paler to white, or back grey, breast pale grey, abdomen white; pose upright, flycatching.

MACHAERIRHYNCHUS Two species; length 4½–6 in.; the very wide, flattened bill, longer than tarsus, is distinctive; pattern includes conspicuous yellow, black and white.

MUSCICAPA One species; length 5 in.; underparts white with breast and flanks heavily streaked fuscous is unique in family; pose upright, flycatching.

MICROECA Five species; length 4½–5½ in.; bill about as long as tarsus or shorter, outline from above nearly triangular; pattern simple and dull, upperparts olive and grey, or olive-grey, underparts yellowish, yellowish olive with grey throat, or whitish and greyish; pose upright, flycatching.

MONARCHELLA One species; length 5½–6 in.; wing long, tail short; pattern unique in family: underparts all white, cap, wings and tail black, back greyish white; usually perched along streams.

PETROICA Two species; length 4½–5½ in.; bill short, much shorter than tarsus and rather stout, little broadened at base; wing long and tail much shorter than wing; pattern simple, largely black with forehead and abdomen white or predominantly slaty and grey with red patch on breast; birds of the high mountains.

TREGALLASIA One species; length 4½–5 in.; bill shorter than tarsus and rather stout; tail rather short; legs rather stout and toes and claws large for the family; plumage pattern distinctive, largely yellow below, olive above with pattern of black and white in head.

POECILODRYAS Five species; length 5–7½ in.; rather stout flycatchers, with rather stout only slightly to fairly well flattened bills; tail somewhat shorter than wing; tarsus somewhat longer and toes stronger than in many members of the family. Each species distinct in coloration: with black and white, grey and white, grey, white and black, or olive and yellow.

**Peltops**

An endemic genus of two very similar species notable for their bold patterns and very large bills.

**Key to *Peltops* Species**

Size smaller, wing 105 mm, or less; lowlands: *P. blainvillii.*
Size larger, wing 106 mm, or more; mountains; *P. montanus.*

***Peltops blainvillii* (Lesson and Garnot)**

Lowland Peltops Flycatcher. Length 7–8 in. Adults: glossy black with white patches from behind eye to side of neck and in centre of upper back, and red rump and upper and under tail-coverts; iris dark red; bill black; feet black. Male wing 102 mm, tail 80 mm, culmen 25 mm, tarsus 16 mm. Female wing 99 mm.

RANGE New Guinea lowlands up to 1,600 ft, and western satellite islands of Misol, Salawati and Waigeu.

REMARKS These rather stout and stolid, boldly marked black, white, and red birds always seem uncommon, despite the fact that they are easily seen, usually singly, sitting up straight on some conspicuous dead branch projecting above the forest. From such perches the birds dart out after passing insects.

***Peltops montanus* (Stresemann)**

Mountain Peltops Flycatcher. Length 8 in. Adults: like *P. blainvillii* but with larger white patch on foreback, and longer wing and tail (but not bill); iris red; bill and feet black. Male wing 114 mm, tail 85 mm, culmen 25 mm, tarsus 17 mm; birds from higher altitudes are larger, up to 119 mm. The immature plumage is like the adult but duller, with white tips to some wing feathers and some white in chin and throat.

RANGE Mountains of New Guinea (Arfak, Weyland and Snow Mountains to Huon Peninsula, and south-eastern New Guinea mountains), from 2,500 to 9,000 ft.

NESTING A neatly woven structure of rootlets, small for the size of the bird, and about twenty feet up in a mountain casuarina (Stein).

REMARKS This is an uncommon species, with habits much like those of the preceding species which it replaces at higher altitudes.

***Rhipidura***

The twelve species of fantail flycatchers in New Guinea are similar in being flycatchers which typically perch on tree or shrub with the body more or less horizontal, and the tail raised above the slightly drooping wings. Some birds spread the tail widely and seem to be always fluttering and flitting about among leaves and twigs, while others seldom

spread the tail and spend much time perched, watching for insects to fly by, but continually fidgeting as they wait. Some species are tame and conspicuous, living in the more open middle parts of the forest, while others are shy and secretive birds of the undergrowth. One, willie wagtail, is a familiar bird in gardens and other more open country.

Nests all seem similar: neat cup or saucer-shaped structures, bound with cobweb and with some material projecting through the bottom of the cobweb lining as an untidy 'tail piece', the 'stem' of the 'wine glass shape', as sometimes described. The nest is small for the size of the bird, and often in quite exposed places, without concealment. When the bird is on the nest, the latter is not obvious, and when the bird is off, the small nest is not conspicuous. These birds seem to be strictly insect eaters.

**Key to *Rhipidura* Species**

1 Upperparts grey or black, without rufous: 2.
Upperparts with conspicuous rufous: 10.
2 Breast and abdomen rufous or chestnut: *R. hyperythra.*
Underparts without rufous: 3.
3 Underparts greyish black, without white: *R. atra* (male).
Underparts with some white at least: 4.
4 Underparts black and blackish grey, except for white chin and white spots on breast: 5.
Lower breast and abdomen white, buffy white, or with large white patch: 6.
5 Tail feathers with large white tips: *R. maculipectus.*
Tail feathers without white tips: *R. threnothorax.*
6 Lower breast and abdomen white or buffy white: 7.
Lower breast and abdomen slaty grey with a large white patch: 9.
7 Throat white, breast band grey to black: 8.
Throat black: *R. leucophrys.*
8 Length $5\frac{1}{2}$ in.: *R. fuliginosa.*
Length 7 in.: *R. rufiventris.*
9 Central and lateral tail feathers tipped white; lowlands: *R. leucothorax.*
Lateral tail feathers only tipped white; high mountains: *R. albolimbata.*
10 Black band across throat: *R. rufifrons.*
No black in underparts: 11.
11 Central tail feathers black, rest rufous: *R. atra* (female).
Mid-portion all tail feathers black, broad tips rufous: *R. brachyrhyncha* (colour phase).
Tail feathers grey to tips: *R. brachyrhyncha* (colour phase).
Tail feathers grey with white tips: *R. rufidorsa.*

***Rhipidura threnothorax* (Müller)**

Sooty Thicket Fantail. Length 6½–7 in. Adult male: chin white; breast black with conspicuous white spots; rest of underparts dark grey shading to black posteriorly; white line over eye; crown and back dull olive-brown (crown feathers more brown in one race), changing to black on rump; tail black; iris dark brown; bill black, basal half of mandible white; feet slaty black; wing 82 mm, tail 94 mm, culmen 21 mm, tarsus 25 mm. Female: similar but duller and paler; wing 73 mm. This species is variable in tints, and some specimens have pale tips to some upper primary coverts.

RANGE Aru Islands, Waigeu, Salawati, Japen and all New Guinea lowlands, up to about 3,000 ft.

SUBSPECIES Two:

a) *threnothorax* (Müller); range of the species except that of *fumosa*.
b) *fumosa* (Schlegel); Japen Island; like *threnothorax* but with crown more brownish.

REMARKS A scarce, shy bird found in the denser pandanus undergrowth of damp forest and its edge, and, more especially in the tall sedge undergrowth in swamp forests and the sedge and cane grass of swamps. The protesting, scolding notes of this species are heard more often than the bird is seen, but it will respond to squeaking; to dart away again quickly.

***Rhipidura maculipectus* (Gray)**

Black Thicket Fantail. Length 7–7½ in. Adult male: chin white with white stripe extending down each side of throat; throat black; breast black with conspicuous white spots; abdomen greyish black; side of head black with semi-concealed white patch over eye; upperparts dull black, middle and greater wing-coverts with small white spots at tip, and lateral tail feathers with broad white tips; iris dark brown; bill black, with mandible pinkish; feet brownish black; wing 85 mm, tail 98 mm, culmen 20 mm, tarsus 22 mm. Female: similar but abdomen duller and paler, and white spotting in wing-coverts reduced.

RANGE Aru Islands, western Papuan Islands (Misol, Salawati and Batanta) and New Guinea in Vogelkop and southern New Guinea, east to Hall Sound (and (?) Orangerie Bay); lowlands.

REMARKS This fantail resembles *R. leucothorax* in behaviour and lives in the tall cane grass and sedge of the tea tree swamp, and to a lesser extent, the sedge in the swamp forests. It is a shy, secretive bird, usually seen darting away into shelter or cautiously coming to the edge of the grass in response to squeaking. One was seen, however, in the open

branches of a shrub over a little pool in the forest. With raised spread tail and drooping wings, it fluttered about after the manner of *R. rufifrons*.

### *Rhipidura leucothorax* (Salvadori)

White-breasted Thicket Fantail. Length 7 in. Adult male: chin to upper breast black, with a white patch on each side of throat; lower breast with a white patch grading into black upper breast in a black, white spotted area; abdomen and sides of body dark grey; sides of head black, a white line from over eye to side of forehead; forehead black; crown brownish black; back dark to medium brownish black sometimes with some dark to black feathers; lesser and median upper wing-coverts with white tips; greater wing-coverts with white tips forming a wing bar; tail black, all feathers with white tips broader on lateral feathers; iris brown; bill black, mandible whitish; feet grey-black; wing 82 mm, tail 98 mm, culmen 21 mm, tarsus 21 mm. Female: similar, wing 76 mm.

RANGE New Guinea lowlands.

SUBSPECIES Two:

a) *leucothorax* (Salvadori); western and central New Guinea, from Vogelkop to Astrolabe Bay in the north, and to Port Moresby in the south.

b) *episcopalis* (Ramsay); eastern New Guinea, west in north to Astrolabe Bay [intergrading with *leucothorax*], and in the south to Kapa Kapa; like *leucothorax* but back browner.

REMARKS Though this species has been found fairly common locally, more often than not it seems rare or absent from lowland localities. It is a shy, retiring bird found in the tall, dense grass and brush of swamps bordering rain forests, and in the low dense cover in the adjacent rain forests. The birds were sometimes quite noisy when disturbed but usually kept well concealed and specimens were difficult to secure.

### *Rhipidura rufifrons* (Latham)

Black-breasted Rufous Fantail. Length 5½–6 in. Adult male: chin and upper throat white; lower throat black, the feathers posteriorly to upper breast black fringed with white; lower breast and abdomen buffy to white (a subspecies); sides of body ochraceous buffy to dark grey (a subspecies); under tail-coverts ochraceous or (in a subspecies) white; side of head grey-brown or black, lower eyelid feathers white; side of forehead to eye rufous or (in a subspecies) white; forehead rufous or (in a subspecies) black and white; top of head and nape dull greyish

brown, changing to dull brown on upper back and wing-coverts, and bright rufous on lower back to upper tail-coverts and basal half or less of tail; distal half or more of tail blackish, feathers with pale grey or white tips, narrow on central ones, broad on lateral ones; iris brown; bill dark horn-colour; feet bluish slate; wing 75 mm, tail 87 mm, culmen 16 mm, tarsus 20 mm.

RANGE Australia to Solomon Islands, Micronesia and Lesser Sunda Islands; in New Guinea chiefly on satellite islands to the east and west, also in western south New Guinea and a winter visitor to south New Guinea; lowlands.

SUBSPECIES IN NEW GUINEA Five, of two different types; one a winter migrant to New Guinea:

a) *rufifrons* (Latham); south-eastern Australia migrating to south New Guinea (Fly River, Gulf of Papua) in winter; forehead and line to over eye rufous, abdomen buffy, flanks and under tail-coverts more ochraceous, rufous covers about half of tail feathers, moderate grey tips to tail feathers; wing 75 mm.

b) *louisiadensis* (Hartert); Rossel and Misima Islands, in Louisiade group, and Bonvouloir group (Hastings and East Islands); like *rufifrons* but tips of tail feathers white.

c) *streptophora* (Ogilvie-Grant); Mimika River area, south New Guinea; like *rufifrons* but tips of tail feathers white, rufous of tail much restricted, to base only, and rufous of forehead extending farther on to crown.

d) *squamata* (Müller); western Papuan Islands (Waigeu, Salawati, Schildpad Islands, Misol) and Banda Islands; differs conspicuously from *rufifrons* in having no rufous in the forehead, which is black, with white line extending from side of forehead to over eye; tail feathers tipped with white.

e) *henrici* (Hartert); South East Islands, Kei Islands and Aru Islands; like *squamata* but slightly larger and with more rufous wing.

NESTING The nest is a tightly woven cup with a kind of tail hanging down, saddled on a branching twig, constructed of fibres and rotten wood; eggs two, light yellowish buff with a ring of pale liver-brown and blackish spots and blotches around larger end; size 18 × 14 mm.

REMARKS While the Archbold Expedition was on the middle and lower Fly River in south New Guinea, from 20 August to 15 November, migrants from Australia were common birds in the forest where they kept the middle spaces and the lower substage. With raised, widely spread tail and slightly drooping wings, they continually fluttered about through the leaves and twigs with exaggerated fantail behaviour. The

resident race from the Mimika River was said to live only in the mangrove swamps.

### *Rhipidura rufidorsa* (Meyer)

Grey-breasted Rufous Fantail. Length 5–5½ in. Adults: crown brownish grey; back, upper wing-coverts, outer edges of wing feathers, and upper tail-coverts rufous; tail feathers grey, more or less tinged rufous towards base and with white tips, narrow on central pair, broad on lateral ones; side of head grey with an indistinct buffy line from nostril to over eye; upper breast obscurely mottled buff and grey; lower breast, abdomen and under tail-coverts buffy white, more buffy on sides of body; iris brown; bill dark brown, mandible pale; feet brown. Male wing 65 mm, tail 72 mm, culmen 13 mm, tarsus 18 mm. Female wing 61 mm.

RANGE New Guinea and Misol and Japen Islands; lowlands up to 3,000 ft.

SUBSPECIES Three very similar ones:

a) *rufidorsa* (Meyer); Misol, Japen Islands and western New Guinea, east in north to Astrolabe Bay, in south to Fly River; rufous of back moderate.
b) *kumusi* (Mathews); north coast of south-eastern New Guinea, from Kumusi River to Collingwood Bay; like *rufidorsa* but rufous of back more vivid.
c) *kubuna* (Rand); like *rufidorsa* but rufous of back duller.

REMARKS This is a fairly common species and is one of the fluffy, fantail members of the genus; a dainty, active bird seen in the tops of the forest undergrowth and the middle spaces of the forest. It has a pleasing whistled song of three notes. In behaviour and habitat this species is similar to *R. rufifrons* to which it is closely related, and which it seems to replace in most of its New Guinea range.

### *Rhipidura brachyrhyncha* (Schlegel)

Dimorphic Rufous Fantail. Length 6–6½ in. Adults: two colour phases are known, differing chiefly in the colour of the tail; crown and fore-back dark brown, shading into rufous of lower back, rump, upper tail-coverts and edgings of wing feathers; side of head like crown or slightly paler; underparts: throat either dark buffy grey changing to greyish ochraceous on breast and abdomen; under tail-coverts rufous (dark-tailed phase), or throat buffy grey changing to greyish buff on breast and abdomen; under tail-coverts buff (pale-tailed phase); tail (dark phase) central area black with rufous terminal and basal portion, shafts dark or (pale phase) tail pale grey with central tail feathers washed darker; shafts white; iris dark brown; bill brownish black,

mandible greyish pink; feet pale brown. Male wing 73 mm, tail 97 mm, culmen 13 mm, tarsus 20 mm. Female wing 69 mm.

RANGE Higher mountains of New Guinea, from 5,500 to 12,000 ft.

SUBSPECIES Two very similar ones:

a) *devisi* (North); Weyland and Snow Mountains, Central Highlands, and mountains of Huon Peninsula and south-eastern New Guinea.
b) *brachyrhyncha* (Schlegel); Arfak Mountains; like *devisi* but slightly darker, more richly coloured.

REMARKS The fantail pose of this bird is the most pronounced and continued of any of the fantails we have seen. With body horizontal, tail almost always raised and widely spread, and with drooping wings, the bird was continually moving through the middle spaces and undergrowth of the mountain forests, perching on twigs, fluttering to take an insect, or clinging to the base of a tree. The birds often sang. Prefaced by a few short calls, the song would start rather deliberately, quickening to a silvery, tinkling warble as the bird's throat pulsed and its tail twitched. Some of these singing birds were not adult. The species was common and went about sometimes singly, more often in pairs, when, as often as not, one was of each colour phase.

### *Rhipidura fuliginosa* (Sparrman)

Grey Fantail. Length 5½–6 in. Adults: upperparts grey, median upper wing-coverts with small white terminal spots, greater ones with white tips forming a wing bar; tail dusky black, lateral tail feathers with white tips, and outermost ones with white outer web; side of head dusky with obscure white line from nostril to over eye; throat white, upper breast and flanks grey; lower breast, abdomen and under tail-coverts buffy white; iris dark brown; bill black; feet grey. Wing 66 mm, tail 75 mm, culmen 12 mm, tarsus 17 mm.

RANGE New Zealand and Australia to Solomon Islands; in New Guinea only recorded in the Hall Sound area of south New Guinea.

SUBSPECIES IN NEW GUINEA One, *phasiana* (De Vis); which also occurs in northern Australia.

NESTING [A neat cup nest is made with a variable 'tail piece' saddled on a low slender branch of a tree. The nest is of dry grass, etc., held together with spider webs; eggs two to three, white, marked with brown and lavender tending to form a wreath around larger end; size 16 × 12 mm. Australian data.]

REMARKS This species has been recorded only a few times in New Guinea, and then in coastal vegetation. The species is migratory, and there is the possibility that New Guinea records are of migrants.

### *Rhipidura atra* (Salvadori)

Black Fantail. Length 6½ in. Adult male: plumage entirely dull black except for some white in under wing-coverts and a semi-concealed white spot over eye; iris dark brown; bill black, mandible pale; feet black; wing 80 mm, tail 88 mm, culmen 16 mm, tarsus 22 mm. Female: crown dark brownish rufous; back, wing-coverts, outer edges of wing feathers, rump, upper tail-coverts and outer tail feathers rufous; central tail feathers black; underparts cinnamon-rufous; soft parts like male; wing 76 mm.

RANGE New Guinea mountains, 3,200 to 10,500 ft, and Waigeu Island.

SUBSPECIES Two very similar ones:

a) *atra* (Salvadori); Arfak and central ranges, Weyland Mountains to south-eastern New Guinea, also Huon Peninsula and Waigeu Island.
b) *vulpes* (Mayr); Cyclops Mountains; like *atra* but female brighter rufous.

REMARKS The black fantail was most common at about 6,000 ft. There it lived in the undergrowth in the forest and the thickets and tangled vegetation at the forest edges and fringing glades. Singly or in pairs, it often joined the mixed feeding flocks of small birds. This species was quick and active, continually moving about. Sometimes its tail was raised and spread and wings slightly drooping, but this pose was not nearly as common or as exaggerated as the corresponding pose of *R. brachyrhyncha* whose range overlapped that of this bird. While not as tame and confiding as some other fantails, this species was curious and sometimes came darting up within a few feet of me, then away again, uttering its sharp metallic chirp or two-syllable note of alarm as it tried to keep just out of sight in the shrubbery. The male, especially, showed the conspicuous orange lining to its mouth, contrasting with its black plumage, as it called. The song was a short, pleasing warble.

### *Rhipidura hyperythra* (Gray)

Chestnut-bellied Fantail. Length 5½–6 in. Adults: upperparts grey, more blackish on crown, with small white or buffy terminal spots on median and greater upper wing-coverts; tail black, lateral feathers with broad white tips; side of head blackish with obscure white line over eye; chin white (variable in extent); throat black with a white line on each side; breast and abdomen chestnut; iris dark brown; bill black, mandible pale; feet brownish. Male wing 80 mm, tail 80 mm, culmen 16 mm, tarsus 18 mm. Female wing 76 mm.

RANGE New Guinea lowlands and hills up to 4,100 ft, also Aru Islands and Japen Island.

SUBSPECIES Three:

a) *hyperythra* (Gray); Aru Islands.
b) *mulleri* (Meyer); Japen Island and western New Guinea, east in the north to Astrolabe Bay, in the south to Fly River; like *hyperythra* but with more white in throat.
c) *castaneothorax* (Ramsay); south-eastern New Guinea, west in the north to Huon Peninsula, in the south to Auga River; like *mulleri* but white tips of outer tail feathers larger.

REMARKS The chestnut-bellied fantail was fairly common in the middle part of the forest and forest edge. It adopts the exaggerated fantail pose and behaviour like *R. rufidorsa*.

### *Rhipidura albolimbata* (Salvadori)

Friendly Fantail. Length 5½–6 in. Adult male: upperparts blackish grey to sooty black, more intensely black on crown, wings, and tail; but upper wing-coverts on middle and greater series with terminal white spots and lateral tail feathers with narrow white tips; side of head black with small white area from nostril to over eye and extending as a semi-concealed line to back of eye; a small white spot in ear-coverts; chin black, upper throat white; breast black, rest of underparts dark grey with a white area in breast and under tail-coverts white; iris dark brown; bill black with basal part of mandible whitish; feet brownish black; wing 80 mm, tail 85 mm, culmen 14 mm, tarsus 19 mm. Female: tends to be duller and greyer; wing 75 mm. Birds from higher altitudes tend to be larger, wing up to 95 mm, and more blackish.

RANGE New Guinea mountains: Vogelkop to south-eastern New Guinea and Cyclops and Saruwaged Mountains; from 4,800 to 11,700 ft.

SUBSPECIES Two:

a) *albolimbata* (Salvadori) (also known as *auricularis*); the range of the species except the range of *lorentzi*; male wing up to 82 mm.
b) *lorentzi* (van Oort); higher altitudes (9,000 to 11,000 ft) of Snow Mountains, and also in the Central Highlands, above the range of the preceding subspecies; like *albolimbata* but larger (wing up to 95 mm) and darker, more blackish.

NESTING A neat cup nest saddled on a small branch of a tree or creeper, twelve to twenty feet up. The outside of the nest is coated with animal silk, and has a short 'tail' projecting below it.

REMARKS This is a common bird in the mountain forest where it frequents the more open, middle spaces of the forest, usually singly. It

was a dainty bird, sitting with its tail raised above the wing tips, but rarely indulging in the fantail pose so characteristic of the dimorphic fantail. Less active than some of its relatives, this species often stayed some time on a single perch, an exposed twig or low pandanus leaf. Though sitting on one perch for some moments, and after catching a passing insect, returning to the same or a nearby perch, it did not sit still but indicated its relationship to its more active relatives by twitching its tail and wings, moving its body, and twisting and turning its head. It was a familiar bird, often coming up to perch near us as we walked through the forest or travelling with a line of carriers along a forest trail. From this we named it the 'friendly flycatcher'. The song, which was seldom heard, was a short song somewhat resembling that of the dimorphic fantail, but finer, higher, and more whistled, less warbled.

***Rhipidura rufiventris* (Vieillot)**

White-throated Fantail. Length 6½–7 in. Adults: crown black; back grey; wings brownish black; tail black, the outer webs with broad white tips and with outer web of outermost white; side of head black with obscure white line over eye; throat white; band across breast dark grey, sometimes with white streaks; lower breast and abdomen white, tinged buffy; iris dark brown; bill black; feet black. Male wing 85 mm, tail 80–90 mm, culmen 18 mm, tarsus 17 mm. Female wing 83 mm.

RANGE Australia to Solomon Islands and Moluccas and Lesser Sunda Islands; in New Guinea, chiefly lowlands and most satellite islands; sea level, occasionally to 5,000 ft.

SUBSPECIES IN NEW GUINEA Four:

a) *vidua* (Salvadori and Turati); western Papuan islands of Kofiau (Popa), Gagi and Gebe; abdomen pure white; breast band with conspicuous white marks.

b) *gularis* (Müller); widespread in New Guinea lowlands and into foothills, also western Papuan islands of Misol, Salawati, Batanta and Waigeu; Geelvink Bay islands of Meos Num and Japen; also Manam Island (Vulcan Island) and D'Entrecasteaux Archipelago (Fergusson and Goodenough Islands); abdomen tinged buffy; white marks on breast band small to lacking.

c) *nigromentalis* (Hartert); Louisiade Archipelago on Tagula and Misima Islands; like *gularis* but with white tips of outer tail feathers much larger.

d) *kordensis* (Meyer); Biak Island in Geelvink Bay; like *gularis* but back and breast band darker, more blackish, and abdomen pure white.

NESTING The nest is a very small, neat saucer-shaped structure ten to twenty-five feet up, saddled on an exposed slender vine, twig or bamboo stem where a bend or fork offered additional support, and with a short 'tail piece'. The nest is of fine strips of bark sometimes with a base of rotten wood, finely bound together with animal silk giving an outer grey coating which also binds the nest to the branch. A characteristic feature, as with so many fantail nests is the break in the bottom of the cobweb coating through which some nest material projects as the 'tail piece'. Eggs whitish with spots of chocolate-brown and grey forming a wreath about the larger end. The young have scanty buffy brown down above and on the abdominal feather tracts. Both sexes feed the young. When incubating, the adult completely overshadows the small nest.

REMARKS This is a common, tame, and conspicuous bird of the forest and forest edge, where it lives in the lower trees and shrubs. Though it often sits with tail above wing tips, in typical fantail pose, the tail is not often spread, and the bird is not as active and restless as some of the spread-tail, fluttering species such as *R. rufidorsa*. This species more often chooses some exposed perch on which it waits for passing insects. In general appearance and behaviour, this lowland species is much like *R. albolimbata* of the high mountain forests.

### *Rhipidura leucophrys* (Latham)

Willie Wagtail. Length 7½–8 in. Adults: black except for white breast, belly and under tail-coverts, and more or less obscure, a white line over eye and another on side of throat; iris dark brown; bill and feet black. Wing 100 (99–108) mm, tail 100 mm, culmen 20 mm, tarsus 25 mm.

RANGE Australia to New Guinea, the Solomon Islands and the Moluccas; lowlands usually, but in Central Highlands reaches 6,000 ft.

SUBSPECIES IN NEW GUINEA TWO:

a) *melaleuca* (Quoy and Gaimard); Moluccas, New Guinea region (except range of *picta*), Bismarck Archipelago and Solomon Islands.
b) *picta* (Gould); northern Australia and south New Guinea (Merauke); like *melaleuca* but smaller (male wing 94–98 mm) and underparts tinged yellowish.

NESTING The nest is a grey, neat cup of grass, bound on the outside with animal silk and sometimes decorated with fine pieces of moss, lichen or a few feathers; composed of grass or other plant fibres, lined with fine grass and rootlets. This neat cup is saddled on to a slender branch, a thin fork, or an exposed dead branch of a stump around which the cobwebs continue. It is placed from a few feet to forty feet up, usually in an open situation; eggs two or three, whitish with brownish spots forming a

wreath about the larger end; size 20 × 16 mm. The young have scant, yellowish white down on upperparts.

REMARKS The willie wagtail is amazingly versatile in its choice of habitat. It is common in towns and villages about the lawns and gardens, in the dry shrubby savannahs, along the banks of the forested rivers, in sea beach vegetation, mangrove edge, and in the Central Highlands in native gardens and forest edge. It was common even in the reed beds and water-lilies of the extensive marshes of the Fly River lagoons, far from any tree or shrub. The main factor in common seems to be open space near shelter or perches, either wet or dry, but the proximity of water seems to be preferred.

These birds, singly or in pairs, rest freely on low perches or on the ground. They flutter and dash out from a perch to snap up an insect, or hop and flutter over the grass of a lawn to pick up insects off the ground, often calling or singing, and never sitting still but fluttering wings and fanning and tilting the tail this way and that.

### *Seisura*

Restless Flycatcher. The single species, length 7 in., resembles certain fantails (the familiar willie wagtail), but is distinctive in its colour pattern.

### *Seisura inquieta* (Latham)

Restless Flycatcher. Length 6½–7 in. Adults: whole upperparts and side of head glossy black; whole underparts from chin to under tail-coverts white; iris dark brown; bill blue-grey, black at tip. Wing 92 mm, tail 85 mm, culmen 20 mm, tarsus 19 mm.

RANGE Australia and south New Guinea at Merauke.

SUBSPECIES IN NEW GUINEA One, *nana* (Gould), which occurs also in northern Australia.

NESTING [A neat cup-shaped structure of fine grass and strips of bark bound with spider webs, the nest is placed on horizontal branch of a tree up to fifty feet from the ground; eggs four, white with wreath of spots around larger end; size 19 × 14 mm. Australian data.]

REMARKS In Australia the restless flycatcher, which resembles the willie wagtail, is said to favour the vicinity of water, and to be called 'scissors grinder' from a harsh metallic call often given when it hovers.

### *Monarcha*

Monarch Flycatchers. The eleven species, lengths 5–7½ in., have the bill somewhat longer than that of *Rhipidura* (equal to or longer than tarsus)

and stouter, and less flattened; the tail is always considerably shorter than the wing and varies from slightly rounded to nearly square at tip; the usual pose is rather upright and with the tail not raised or spread (*M. axillaris* is an exception).

**Key to *Monarcha* Species**

1 Upperparts entirely black: 2.
Upperparts not so: 3.
2 Underparts entirely black: *M. alecto* (male).
Underparts black, except for white tufts sides of breast: *M. axillaris.*
Throat and breast black; abdomen white: *M. manadensis.*
3 At least back and tail rufous: 4.
No rufous in upperparts: 5.
4 Crown rufous: *M. rubiensis.*
Crown black: *M. alecto* (female).
5 Breast or abdomen rufous: 6.
Abdomen white, yellow or yellow-olive: 9.
6 Conspicuous white tips to outer tail feathers: *M. trivirgatus.*
No white tips to tail feathers: 7.
7 Head and neck all grey: *M. cinerascens.*
Front part of head black, rest of head grey: 8.
8 Wings and tail black, contrasting with grey back: *M. frater.*
Wings and tail mostly grey, not contrasting with grey back: *M. melanopsis.*
9 Abdomen and crown yellow; tail all black: *M. chrysomela.*
Abdomen and part of tail yellow; crown black: *M. brehmii.*
Breast and abdomen white; back grey: *M. guttula.*
Abdomen yellow or yellow-olive; upperparts olive: *M. chrysomela* (female).

***Monarcha axillaris* (Salvadori)**

Black Monarch Flycatcher. Length 6–6½ in. Adult male: glossy black with a tuft of white feathers on each side of breast; iris dark brown; bill pale grey, black at tip; feet blackish; wing 84 mm, tail 75 mm, culmen 15 mm, tarsus 19 mm. Female: similar but duller; wing 80 mm.

RANGE New Guinea mountains and Goodenough Island, from 3,800 to 7,700 ft.

SUBSPECIES Two:

a) *axillaris* (Salvadori); Arfak, Wandammen and Weyland Mountains.
b) *fallax* (Ramsay); Snow and Victor Emanuel Mountains, Central Highlands, and mountains of Huon Peninsula and south-east New Guinea, also Goodenough Island; like *axillaris* but white patches on sides of breast smaller and abdomen greyer.

4 *Astrapia mayeri*, Ribbon-tailed Astrapia (top left); *Paradisaea rudolphi*, Blue Bird of Paradise (top right); *Paradisaea rubra*, Red Bird of Paradise (centre left); *Paradisaea minor*, Lesser Bird of Paradise (centre right); *Paradisaea raggiana*, Raggiana Bird of Paradise (bottom).



REMARKS A rather uncommon solitary bird found in the lower parts of the heavy forest, and out into second growth forest. It was rather restless and active in its movements, moving from perch to perch and darting out after insects. In this and in its pose, with slightly drooping wings and slightly spread and raised tail, and its buzzing, chattering call, it resembles a fantail (*Rhipidura*), rather than the other members of the genus *Monarcha*.

### *Monarcha rubiensis* (Meyer)

Rufous Monarch Flycatcher. Length 7 in. Adult male: plumage rufous, duller and more brownish on crown, paler on underparts, and with chin and upper throat black; iris dark brown; bill slaty blue; feet slaty blue; wing 97 mm, tail 85 mm, culmen 20 mm, tarsus 20 mm. Female: similar but without any black feathers; wing 90 mm.

RANGE North New Guinea from head of Geelvink Bay to Ramu River, also south-west New Guinea from Triton Bay to Setekwa River; lowlands (rarely to 4,500 ft).

REMARKS A bird found in the lower branches and undergrowth of the forest. We have never seen it.

### *Monarcha alecto* (Temminck)

Shining Monarch Flycatcher. Length 6½–7 in. Adult male: plumage black, glossed blue of various shades; iris dark brown; bill slate-blue, tip black; feet dark slate; wing 97 (88–97) mm, tail 80 mm, culmen 25 mm, tarsus 20 mm. Female: top and sides of head black; rest of upperparts rufous; underparts white, tinged ochraceous on flanks and under tail-coverts; wing 86–91 mm.

RANGE Australia to Moluccas, New Guinea and Bismarck Archipelago. In New Guinea, in lowlands and up to 1,000 ft, and on many satellite islands.

SUBSPECIES IN NEW GUINEA Five very similar ones:

a) *chalybeocephalus* (Garnot); western Papuan Islands, all New Guinea except Fly River area, islands of Geelvink Bay, Karkar (Dampier) Island and Bismarck Archipelago.
b) *manumudari* (Rothschild and Hartert); Manam (Vulcan) Island; female with back very pale rufous.
c) *lucidus* (Gray); islands of D'Entrecasteaux Archipelago, Amphlett group, Trobriand and Woodlark Islands and Louisiade Archipelago (Joannet, Misima and Tagula).
d) *rufolateralis* (Gray); Aru Islands; female with very dark back.
e) *nitidus* (Gould); northern Australia and Fly River area of south

New Guinea; like *chalybeocephalus* but female with back darker and foreback greyish black.

NESTING The nest is a neat, firm, cup-shaped structure placed three to eight feet up in the fork of a slender sapling-like tree, and usually in open, shaded places in the forest along the edge of waterways. The nests were without concealment and rather conspicuous. They were composed largely of bark fibres and flakes and bound together with animal silk which also bound the nest to the fork; small flakes of bark and bits of lichen were stuck over the outside as if for ornamentation; the lining was of fine black fibres; eggs two, pale greenish blue, marked with dark brown and grey, more densely in a zone about larger end; size 22 × 15 mm. The newly hatched young are black with scanty blackish brown down on the feather tracts of the upperparts. Both sexes incubate.

REMARKS The shining monarch's favourite habitat in south New Guinea was the shrubbery in the forest along waterways, swamp and lagoon; along the coast it frequented mangroves, and on Daru Island it lived in second growth. The birds usually sit erect, watching for insects, and then fly out and snap them up. A different pose is sometimes assumed: head thrust forward, feathers of top of head flattened against skull, and those of nape erected into a sort of crest or ruff. The song, which was often heard, was a series of softly whistled notes, and a frequently uttered harsh, scolding 'screek'.

***Monarcha cinerascens* (Temminck)**

Island Grey-headed Monarch Flycatcher. Length 6½–7½ in. Adults: ashy grey except for lower breast, abdomen, and under tail-coverts which are rufous; iris brown; bill varies, slaty or black with yellow base; feet slate-blue. Wing 90 mm, tail 80 mm, culmen 23 mm, tarsus 21 mm.

RANGE Timor and Moluccas to New Guinea and Solomon Islands; in the New Guinea region on many satellite islands and occasionally along the shore of north New Guinea from Sorong to Huon Peninsula.

SUBSPECIES IN NEW GUINEA Six very similar ones:

a) *inornatus* (Garnot); Aru Islands, Misol, Waigeu and north coast of Vogelkop.
b) *steini* (Stresemann and Paludan); Numfor Island, Geelvink Bay.
c) *geelvinkianus* (Meyer); Japen, Biak and Meos Korwar, Geelvink Bay.
d) *fuscescens* (Meyer); islands off north New Guinea, between Mamberamo River and Humboldt Bay.
e) *nigrirostris* (Neumann); Manam and Karkar Islands and coast of north-eastern New Guinea from Tarawai east to Huon Gulf.

f) *rosselianus* (Rothschild and Hartert); D'Entrecasteaux Archipelago and other eastern satellite islands to Louisiade Archipelago.

REMARKS This is another of the peculiar 'small island species' with a very wide range, but occurring for the most part only on small islands. When it occurs on a large island, it is usually found only in the immediate vicinity of the sea.

***Monarcha melanopsis* (Vieillot)**

Grey-winged Monarch Flycatcher. Length 6½–7 in. Adults: forehead, forepart of side of head, chin and throat black; rest of upperparts including edgings of wing quills, central tail feathers and edgings of lateral ones, blue-grey; side of head grey with whitish wash about eye; breast, side of neck, and upper breast grey, paler than back; lower breast, abdomen and under tail-coverts chestnut; iris dark brown; bill and feet blue-grey. Male wing 91 mm, tail 70 mm, culmen 23 mm, tarsus 20 mm. Female wing 85 mm.

RANGE Northern and eastern Australia; on migration and during the winter in eastern New Guinea, west in the south to Fly River and Merauke, and on the north to Huon Gulf; also Fergusson, Goodenough, Tagula and Trobriand Islands.

NESTING [Cup-shaped, on branch up to thirty feet above ground; eggs two or three, white and brown and grey spots tending to form a wreath about larger end; size 23 × 17 mm. Australian data.]

REMARKS Though this bird is considered only an off-season visitor to New Guinea, with occasional stragglers staying into the austral summer, there is the possibility that there may be a resident population in south New Guinea.

In the lowlands of south-east New Guinea, I found this species feeding in the middle spaces of the rain forest. It was a rather slow moving, inactive bird, picking insects from twigs and leaves, looking about and occasionally flying and hovering to snap an insect from a leaf, but rarely taking insects on the wing.

***Monarcha frater* (Sclater)**

Black-winged Monarch Flycatcher. Length 6 in. Adults: area around bill, on forehead, side of head to eye, chin and upper throat black; rest of head, neck and breast pale ashy grey; back, upper tail-coverts, and inner wing-coverts pale ashy grey; tail and wing quills and primary coverts black, contrasting with grey back (inner secondaries may be edged grey); some black may be present in upper tail-coverts; lower breast, abdomen and under tail-coverts chestnut; iris dark brown; bill

blue-grey, tip black; feet blue-grey. Male wing 89 mm, tail 70 mm, culmen 21 mm, tarsus 20 mm. Female wing 85 mm.

RANGE New Guinea mountains, from 2,000 to 4,800 ft.

SUBSPECIES Three:

a) *frater* (Sclater); Vogelkop Mountains and north slope of the Snow Mountains; black of face reaching only to front edge of eye.
b) *kunupi* (Hartert and Paludan); Weyland Mountains; black reaching to back edge of eye; inner secondaries all black; longer upper tail-coverts black.
c) *periophthalmicus* (Sharpe); mountains of eastern and central New Guinea, west to south slope of the Snow Mountains, and to the Victor Emanuel Mountains; like *kunupi* but less black on top of head, inner secondaries edged grey, and upper tail-coverts with little or no black.

REMARKS This was one of the commonest flycatchers in the lower mountains where it lived in the upper and middle parts of the forest and through the older second-growth trees. In the treetops this bird moves about actively from perch to perch among the leafy ends of the branches, apparently snapping up insects from twigs and leaves as well as flying out and taking them on the wing.

### *Monarcha manadensis* (Quoy and Gaimard)

Black and White Monarch Flycatcher. Length 6–6½ in. Adults: black more or less glossy, except lower breast, abdomen and under tail-coverts which are white; iris dark brown; bill black; feet grey. Male wing 85 mm, tail 69 mm, culmen 18 mm, tarsus 18 mm. Female wing 82 mm.

RANGE All New Guinea; lowlands up to 1,200 ft.

NESTING The nest is situated about six feet up in a slender sapling and without any near concealing vegetation; composed externally of green moss and lined with fine rootlets; eggs two. (Stein.)

REMARKS Much of the time, this bird lives in the undergrowth and the dark, low substage of the forest where it is shy and with something of the habits of *Rhipidura threnothorax*. I have also seen it higher in the forest, moving about quietly, darting out after passing insects, and snapping prey from twigs and leaves, much like other monarchas living in the middle spaces of the forest.

### *Monarcha guttula* (Garnot)

Spot-wing Monarch Flycatcher. Length 5½–6 in. Adults: front half of crown black; hind crown, back and rump dark blue-grey; wing-

coverts black, the middle series with conspicuous white terminal spots; wing quills dusky externally edged with grey; upper tail-coverts and tail black, the lateral tail feathers with white tips; side of head black edged with a thin line of white; chin, throat and upper breast black; lower breast, abdomen and under tail-coverts white; iris dark brown; bill pearly blue; feet grey. Wing 80 mm, tail 70 mm, culmen 18 mm, tarsus 17 mm. Some females, presumably immature, have sides of head and throat grey and lower breast washed with rufous.

RANGE All New Guinea, and western Papuan and Aru Islands, Meos Num and Japen Islands, D'Entrecasteaux and Louisiade Archipelago; sea level to 3,800 ft.

NESTING Six to nine feet up in a main fork of a slender sapling in the open substage of the forest where there is a heavy canopy overhead, the nest is a neat, firm cup composed externally of fine green moss with animal silk bound over the outside and around the fork; lining of blackish rootlets; eggs two, pinkish white with spots and dots of earthy brown most plentiful around larger end, forming a wreath there; size 21 × 15 mm. The young: natal skin is blackish; natal down brownish black and plentiful.

REMARKS This is a bold, harshly chattering, militant-looking bird, something like the shining monarch in behaviour and different from the fluffy, fluttering, friendly-looking *Rhipidura* fantails. It lives in the forest substage.

***Monarcha julianae* (Ripley)**

Kofiau Monarch Flycatcher. Like *M. guttula* but slightly larger, and back bluish black rather than grey; wing-coverts bluish black without white spots; black bib reduced to a diamond-shaped throat patch. Wing 81 mm, tail 73·5 mm, culmen 17 mm.

RANGE Kofiau Island in western Papuan Islands.

REMARKS Ripley described this species in 1959 on the basis of a single specimen. Despite its close resemblance to *M. guttula*, which also occurs in Kofiau, this species appears to be related to certain Moluccan species.

***Monarcha trivirgatus* (Temminck)**

Spectacled Monarch Flycatcher. Length 6 in. Adults: forehead black, crown and back blue-grey; upper wing-coverts black, wing quills dusky edged grey; upper tail-coverts black, tail quills black, lateral ones with large white tips; chin, throat and side of head to above eye black, except for area below eye which is rufous and which joins pale rufous of

breast; abdomen and under tail-coverts white tinged rufous; flanks rufous; iris dark brown; bill dark blue; feet black. Wing 80 mm, tail 72 mm, culmen 17 mm, tarsus 17 mm. Immatures: grey above and on sides of head, chin grey, and rest of underparts orange rufous paler to whitish posteriorly.

RANGE Timor and Moluccas, western Papuan island of Salawati; south New Guinea, Louisiade Archipelago, and eastern Australia (north to Cape York).

SUBSPECIES IN NEW GUINEA Two (perhaps three) similar ones:
a) *bernsteini* (Salvadori); the western Papuan island of Salawati.
b) *melanopterus* (Gray); Louisiade Archipelago.
c) a population evidently exists in south New Guinea (Fly River area) but is known only from three immature specimens.

NESTING [Deep cup of rootlets, etc., placed in fork up to twenty feet from ground; eggs two, spotted more densely around larger end; size 21 × 15 mm. Australian data.]

REMARKS The distribution of this species is peculiar: certain small islands only in parts of its range; the mainland in others.

### *Monarcha brehmii* (Schlegel)

Biak Monarch Flycatcher. Length 6½ in. Adult male: top of head and back blue-black as are sides of face, throat and breast; above eye a pale yellow spot; behind eye to over ear-coverts a line of pale yellow; median and greater wing-coverts yellow forming a conspicuous patch; rest of wing black except for pale yellow inner secondaries; upper tail-coverts and tail pale yellow, tail feathers tipped with black; abdomen pale yellow. Wing 86 mm, tail 73 mm, exposed culmen 15 mm, tarsus 17 mm.

RANGE Biak Island in Geelvink Bay.

REMARKS The nearest relatives of this species live in the Bismarck Archipelago and the Admiralty Islands. It seems a very rare bird, at least in collections, and to have been met with by few naturalists.

### *Monarcha chrysomela* (Lesson and Garnot)

Black and Yellow Monarch Flycatcher. Length 5–5½ in. Adult male: top and sides of head (down to eye) and neck orange-yellow; foreback black; lower back to upper tail-coverts yellow; tail black; wing-coverts mostly yellow; wing quills black, inner secondaries edged yellow; chin, throat (to eye) black with small, white spot below eye; rest of underparts yellow; iris dark brown; bill slaty blue with black tip; feet slaty blue; wing 70 mm (up to 80 mm in subspecies), tail 56 mm, culmen

16 mm, tarsus 17 mm. Female: upperparts olive-green faintly scalloped with dusky and more or less tinged gold; underparts olive-yellow to golden yellow, more olive on throat; a white mark below eye present or absent; wing 70 mm.

RANGE New Guinea, some satellite islands, and in the Bismarck Archipelago; lowlands up to 3,000 ft.

SUBSPECIES IN NEW GUINEA Five:

a) *kordensis* (Meyer); Biak Island, Geelvink Bay; male with very deep orange-yellow, especially on head, black of back reduced; wing up to 80 mm.
b) *melanonotus* (Sclater); western Papuan islands of Misol, Salawati and Waigeu, and north-western New Guinea, east in the south to Etna Bay, in the north to Wandammen Peninsula; like *kordensis* but smaller (wing to 75 mm), black of back more extensive.
c) *aurantiacus* (Meyer); north New Guinea (head of Geelvink Bay to Astrolabe Bay); like *melanonotus* but generally more intensely yellow.
d) *praerepta* (White); eastern New Guinea, west in south to Fly River, in north to Huon Peninsula; also Fergusson, Goodenough and Normanby Islands; like *aurantiacus* but male paler yellow, size smaller, wing 70 mm.
e) *aruensis* (Salvadori); Aru Islands and western south New Guinea (Mimika to Noord River); a small, pale form; male as in *praerepta* but female more olive above and below.

REMARKS A bird found in the lower parts of the forest, sometimes going up into the lower treetops where it moves about rather actively, snatching insects from leaves and twigs as well as out of the air.

### Arses

Frilled Flycatcher The single species in New Guinea is similar to *Monarcha* in proportions, but it is unique in having a fleshy wattle around the eye.

### *Arses telescophthalmus* (Garnot)

Frilled Flycatcher. Length 6–6½ in. Adult male: conspicuous, blue fleshy ring around eye; chin black; rest of underparts white, which extends on to ear-coverts and sides of neck to join white band on hind neck (one subspecies breast and hind neck rufous); top of head to around eye and lores black; hind neck white; upper back and wings glossy black; lower back and rump white; upper tail-coverts and tail black; iris brown; bill grey; eye wattle blue; feet blue-grey; wing 82 mm (subspecies to 92 mm), tail 75 mm, culmen 19 mm, tarsus 18 mm. Female: wattle present, crown and side of head black (or in a subspecies, grey);

rest of upperparts generally bright rusty brown to dull brown, depending on subspecies; chin, throat and breast pale rusty brown to rich orange rust; abdomen white or (in a subspecies) washed rufous; slightly smaller than male.

RANGE New Guinea and some of the western satellite islands; lowlands and up to 5,000 ft. (Related forms in Australia.)

SUBSPECIES IN NEW GUINEA Seven:

a) *telescophthalmus* (Garnot); Misol, Salawati, and north-western New Guinea, east in the south to Etna Bay, in north to head of Geelvink Bay; male wing 80–86 mm.
b) *batantae* (Sharpe); Batanta and Waigeu Islands; like *telescophthalmus* but larger, male wing 84–92 mm.
c) *aruensis* (Sharpe); Aru Islands; smaller, male wing 76–82 mm, and female with darker, browner (less rusty) back and breast.
d) *harterti* (van Oort); south New Guinea (Mimika to Purari River); like *aruensis* but with eye wattle less developed, and female with duller, browner back.
e) *henkei* (Meyer); south-eastern New Guinea on south coast, west to Hall Sound; differs from all the above in male having a smaller area of black in the chin; female with abdomen white (as preceding races) or more or less washed rufous; back as in *telescophthalmus*.
f) *lauterbachi* (Reichenow); south-eastern New Guinea on north coast west to Huon Peninsula; very like *telescophthalmus* but female more rufous on abdomen.
g) *insularis* (Meyer); Japen Island and northern New Guinea (Mamberamo River to Astrolabe Bay); very different from all the other races as male has breast, throat and hind neck not white but rust-coloured, and female with top of head not black but ashy-coloured, and back dull brown (not rust-brown); male wing 75–82 mm.

NESTING A small, shallow, semi-pensile cup placed between two small, vertical, pendant vines with the attachment at each side to the lianas made by carrying the rim of the nest to a peak around the liana; placed from ten to forty feet from the ground and hanging in open spaces in the forest. Nests were slightly untidy, thin and loosely constructed of short, slender, semi-woody stems, some of them pubescent which helped to hold them together, but animal silk was extensively used to hold the nest together, attach it, and to hold a few bits of dead leaves and lichens as decoration on the outside. There was a lining of blackish rootlets; eggs two, pinkish white, with spots and dots of browns and greys, most plentiful about the larger end; size 19 × 14 mm. Nest building was undertaken by both sexes making trips at two or three minute intervals;

the male also helps incubate or brood. The attentive and inattentive periods were forty to fifty minutes long. The young have scant dusky natal down.

REMARKS This is a common, conspicuous forest bird of the lowlands, which is scarce on the lower mountain slopes. It lives chiefly in the middle spaces but also ranged up into the lower treetops. It is an active, militant-looking bird with erect carriage and feathers of nape erected into a 'frill'. The bird gives a frequently uttered harsh cry, continually moving about, flying out for a passing insect, or taking one from a twig or leaf. Usually it perches on a twig, but frequently a bird clings to the side of a tree trunk, a rather characteristic action of the species. The tail is occasionally jerked downward. The species is not at all shy, paying little attention to man, and is rather noisy and besides harsh, scolding calls gives a trilled song. Sometimes when singing the bird makes short, whirring flights from twig to twig.

### Myiagra

Myiagra Flycatchers. The four New Guinea species, length 5–6 in., are somewhat like *Monarcha* in proportions, but with bill weaker, flatter and outlines of sides seen from above convex. The colour pattern is simple, upperparts black or grey, underparts black, or throat and upper breast black, rufous, grey or whitish, and rest of underparts white. Pose upright, flycatching.

### Key to *Myiagra* Species

1 Upperparts all black: 2.
Upperparts blue-grey to ashy or brownish grey: 3.
2 Underparts all black: *M. atra* (male).
Throat and breast black, abdomen white: *M. cyanoleuca* (male).
3 Throat and breast blue-grey, abdomen white: *M. rubecula* (male).
Throat and breast orange-buffy to rusty brown: 4.
Breast dirty grey, throat whitish: *M. atra* (female).
4 Size larger, wing to 91 mm, culmen to 19 mm: *M. cyanoleuca* (female).
Size smaller, wing up to 80 mm: 5.
5 Bill shorter (16 mm) and narrower (5 mm): *M. rubecula* (female).
Bill longer (18 mm) and broader (7 mm): *M. ruficollis* (male and female).

### *Myiagra rubecula* (Latham)

Leaden Myiagra Flycatcher. Length 5–5¾ in. Adult male: upperparts generally blue-grey; side of head, chin, throat and breast blue-grey darker than back (almost black in one subspecies) and with a bluish gloss; abdomen white; iris dark brown; bill dark slaty blue; feet black;

wing 75 mm (up to 80 mm, subspecies), tail 64 mm, culmen 17 mm, tarsus 14 mm. Female: upperparts blue-grey, paler than male; breast rufous brown, paler on chin; abdomen white tinged ochraceous; wing 70 mm (subspecies up to 77 mm).

RANGE Australia and New Guinea (resident and wintering birds from the south), in south and eastern New Guinea and adjacent satellite islands; sea level, occasionally to 1,500 ft.

SUBSPECIES IN NEW GUINEA Three:

a) *rubecula* (Latham); breeds in southern Australia; when migrating and in the winter it is found in north Queensland and south New Guinea (Fly River area); male wing 80 mm, female wing 77 mm.
b) *papuana* (Rothschild and Hartert); eastern and southern New Guinea, west in the south to Triton Bay and in the north to Kumusi River; like *rubecula* but smaller with a shorter bill and in the male with paler upperparts and duller lores and duller, less iridescent throat; male wing 75 mm, female wing 70 mm.
c) *sciurorum* (Rothschild and Hartert); Louisiade Archipelago (Rossel, Tagula and Misima), Conflict group and D'Entrecasteaux (Fergusson and Dobu Islands); like *rubecula* but smaller, male wing 75 mm, and crown and throat darker and more glossy.

NESTING [Cup-shaped structure of fine shreds of bark held together with cobweb in which bits of bark and lichen are stuck, and lined with rootlets; placed in branch of a tree; eggs three, white, with brown and grey spots, especially around larger end; size 16 × 14 mm. Australian data.]

REMARKS The resident subspecies is strictly a savannah bird where it is common and conspicuous. It is usually found singly and it resembles both a flycatcher and a warbler. It sits upright on a twig, turning its head this way and that, flying up to a leaf to pick off an insect, or picking one off a twig, or darting out after a flying one, and it is continually moving to a new perch. A slight flitting of the tail is rather distinctive. The Australian migrant differs from the resident bird in not only frequenting the savannah, but also venturing into the edge of the forest.

### *Myiagra cyanoleuca* (Vieillot)

Satin Myiagra Flycatcher. Length 6 in. Adult male: plumage glossy bluish black except for abdomen and under tail-coverts being white; iris dark; bill slaty blue, black at tip; feet black; wing 91 mm, tail 79 mm, culmen 19 mm, tarsus 15 mm. Female: upperparts dull brownish grey; breast rusty brown paler on chin and throat; abdomen white tinged buffy; wing 82 mm.

RANGE The bird breeds in Tasmania and eastern Australia, and winters north to south New Guinea (west to Noord River) and the satellite islands off eastern New Guinea and to New Britain. Lowlands up to 1,500 ft, rarely to 4,400 ft.

REMARKS Most of the few specimens of this migrant recorded in New Guinea were found in savannah country; presumably it also occurs in beach vegetation. In colour and pattern this species is remarkably like *Monarcha manadensis*. The most obvious difference between the two, apart from such structural characters as the wider, flatter bill, longer rictal bristles, and shorter tarsus of the satin myiagra, is that the white on the abdomen extends farther forward at each side of the breast in *Monarcha manadensis* while in the satin myiagra it extends forward in the centre of the breast.

### *Myiagra ruficollis* (Vieillot)

Broad-billed Myiagra Flycatcher. Length 6 in. Adult male: upperparts slaty blue, darker and more glossy on crown; throat and breast orange-buff; abdomen white more or less tinged buffy; iris dark brown; bill black, mandible grey; feet black; wing 75 mm, tail 72 mm, culmen 18 mm (and 7 mm wide at nostril), tarsus 20 mm. Female: similar but less gloss above and throat much paler rust colour.

RANGE North Australia to south New Guinea and Timor.

SUBSPECIES IN NEW GUINEA One, *mimikae* (Ogilvie-Grant); south New Guinea from Mimika to Laloki Rivers, also Aru Islands, islands in Torres Straits and northern Queensland.

NESTING [A cup-shaped structure of strips of bark, cobwebs, lichen, etc., in fork of a tree branch; eggs two, white with spots and dots of brown and grey, more plentiful about larger end; size 18 × 14 mm. Australian data.]

REMARKS This is one of the few species of bird which in New Guinea seem restricted to the mangrove forests.

### *Myiagra atra* (Meyer)

Black Myiagra Flycatcher. Length 5–5½ in. Adult male: black, heavily glossed with dark blue on crown, back and breast; iris dark brown; bill dark slate; feet black; wing 72 mm, tail 57 mm, culmen 17 mm, tarsus 16 mm. Female: upperparts grey, more blue-grey on head; lores and area behind eye dull black; breast dull, dirty grey, throat paler to white on chin; abdomen white; wing 67 mm.

RANGE Numfor and Biak Islands in Geelvink Bay.

REMARKS Ripley writes that this species which is of very restricted range is a bird found in open, original forest or high trees above second growth along streams. It has a very distinctive song consisting of one high note followed by a trilled note one-fifth below it, a song with a ventriloquistic quality. The small size of the all-black male separates it at once from the larger all-black monarch flycatcher which it resembles in colour.

### *Machaerirhynchus*

Flatbill Flycatchers. The two species, lengths 4½–6 in., have conspicuous yellow in their plumage and are distinguished by their extraordinarily wide, flat bills.

### Key to *Machaerirhynchus* Species

With black patch on breast: *M. nigripectus.*
Without black patch on breast: *M. flaviventer.*

### *Machaerirhynchus flaviventer* (Gould)

Yellow-breasted Flatbill Flycatcher. Length 4½ in. Adult male: crown black with forehead and eyebrow stripe yellow or white; back black or black mixed with green; rump olive-green, more or less mixed with black and long feathers tipped with yellow; upper tail-coverts and tail black, with outer tail feathers broadly tipped and edged with white; wing black with much white in upper wing-coverts and on outer edge of inner secondaries; lores black; posterior side of head yellow; chin and sometimes upper throat white, rest of underparts yellow; iris dark brown; bill black; feet slate-grey; wing 60 mm, tail 40 mm, culmen 18 mm with width at nostril 9 mm, tarsus 14 mm. Female: top of head grey more or less tinged olive; back and rump green; tail fuscous, the lateral tail feathers narrowly tipped and edged with pale grey; middle and greater wing-coverts dusky narrowly tipped white; wing quills dusky edged green; eyebrow stripe yellowish or buffy; throat white; breast finely mottled grey, yellow-green and white; sides of breast and flanks yellow-green becoming whitish or white on abdomen.

RANGE Northern Queensland, New Guinea and its western satellite islands; lowlands and up to 3,200 ft.

SUBSPECIES IN NEW GUINEA Four:

a) *albifrons* (Gray); western Papuan islands of Waigeu and Salawati; male wing 55–59 mm; chin only white; forehead and eyebrow stripe yellow.
b) *albigula* (Mayr and de Schauensee); Misol Island, Vogelkop, and western New Guinea east in the south to Triton Bay, in the north to

Astrolabe Bay; like *albifrons* but male with more white on chin and throat, and larger; male wing 59–62 mm.

c) *novus* (Rothschild and Hartert); north coast of south-east New Guinea west to Huon Peninsula; culmen 17·5–18·5 mm; like *albigula* but male still more white on throat and more yellow (less orange) underparts.

d) *xanthogenys* (Gray); Aru Islands and south New Guinea (Mimika River to Milne Bay); like *novus* but male with forehead and eyebrow stripe yellow; bill smaller, culmen 16–17 mm.

NESTING [A cup-shaped structure of strips of bark, cobweb, etc., in a fork of a branch; eggs two, with brown and grey spots, chiefly about larger end; size 17 × 13 mm. Australian data.]

REMARKS This species seems to be an uncommon and unobtrusive bird found in the middle spaces of the forest, and with habits much like those of the black-breasted flatbill. However, Ripley saw a bird hopping on the bank of a small stream in lowland forest, chasing a whirling group of mosquitoes.

### *Machaerirhynchus nigripectus* (Schlegel)

Black-breasted Flatbill Flycatcher. Length 5–6 in. Adult male: whole upperparts and lores glossy black except for whitish tips to some feathers of forehead, broad white tips and edgings to middle and greater wing-coverts, and edgings to inner secondaries, and white tips to lateral tail feathers, largest on outermost; underparts from chin to under tail-coverts and side of head yellow except for a black patch in middle of breast; iris dark brown; bill black with white tip; feet black; wing 60 mm (up to 66 mm in subspecies), tail 54 mm (up to 66 mm in subspecies), culmen 17 mm (width at nostril 9 mm), tarsus 16 mm. Female: like male but upperparts duller, greyish black, sometimes tinged olive; black breast patch smaller; and blackish band from bill to ear-coverts with a yellow eyebrow stripe above it.

RANGE New Guinea mountains, from 4,000 to 9,000 ft.

SUBSPECIES Three:

a) *nigripectus* (Schlegel); mountains of Vogelkop; male wing 60 mm, tail 54 mm; female with sooty black back.

b) *saturatus* (Rothschild and Hartert); Weyland, Snow and Sepik Mountains and Central Highlands; larger, male wing 66 mm, tail 65 mm; female with blacker back.

c) *harterti* (van Oort); mountains of Huon Peninsula and south-eastern New Guinea; like *saturatus* in size, but female with back duller.

NESTING '. . . about 10 ft off ground, of moss and delicate epiphyte roots . . .', '. . . one downy young . . .' (Ripley).

REMARKS Locally the black-breasted flatbill was not uncommon in the second-storey forest trees, and it occasionally came down into the undergrowth near the ground. It was usually solitary and somewhat active, moving about through the branches, snapping up flying insects. In appearance it was surprisingly long-tailed, and the tail was often held above the wing tips but not spread. One bird singing from a perch well up in a forest tree interrupted its performance to dart out after flying insects.

### Muscicapa

Grey-spotted Flycatcher. The single species to reach New Guinea, length 5 in., is a rather short-tailed, long-winged species with a distinctive pattern; underparts white with breast and flanks streaked fuscous. Pose upright, flycatching. This is a very large genus in Asia and Africa.

### *Muscicapa griseisticta* (Swinhoe)

Grey-spotted Flycatcher. Length 5 in. Adults: Upperparts brownish grey obscurely streaked with blackish on crown; greater wing-coverts and inner secondaries narrowly edged with greyish white, which disappears with wear; underparts white heavily streaked with dusky brown on sides of throat, breast and flanks; iris dark brown; bill dark brown with base of mandible pale; feet black. Wing 80 mm, tail 45 mm, culmen 14 mm, tarsus 15 mm.

RANGE Eastern Asia, on migration south to Philippines, Moluccas, Caroline Islands and New Guinea, where recorded chiefly in the west (Vogelkop) and on western satellite islands but as far east as Victor Emanuel Mountains.

REMARKS In its winter quarters, this flycatcher probably frequents second growth and the edge of the forest, where it sits up quietly, often on exposed perches at some height, and catches insects on the wing.

### Microeca

Microeca Flycatchers. The five species, lengths $4\frac{1}{2}$–$5\frac{1}{2}$ in., have rather short (usually shorter than the tarsus), flat, triangular bills and a simple pattern; four are yellow and olive birds with or without some grey on head; one is pale greyish olive above, whitish and grey below, and is unique in having the outer tail feathers completely white. Pose upright, flycatching.

**Key to *Microeca* Species**

1 Outer tail feathers mostly white: *M. leucophaea.*
Not so: 2.
2 Lower mandible yellow: 3.
Lower mandible black or brown: 4.
3 Throat greyish white: *M. griseiceps.*
Throat yellow: *M. flavovirescens.*
4 Whole underparts rich yellow: *M. papuana.*
Throat yellowish white, abdomen pale yellow: *M. flavigaster.*

***Microeca leucophaea* (Vieillot)**

White-tailed Flycatcher. (the 'Brown Flycatcher' of Australia). Length $5\frac{1}{2}$ in. Adults: upperparts greenish grey; wing quills fuscous, primaries narrowly tipped white and inner secondaries more broadly edged with white; central tail feathers black, rest tipped with white, the outermost white to base; underparts yellowish white, with breast washed with pale grey; iris dark brown; bill and feet black. Wing 80 mm, tail 50 mm, culmen 14 mm, tarsus 18 mm.

RANGE Australia and south-eastern New Guinea in Port Moresby area.

SUBSPECIES IN NEW GUINEA One, *zimmeri* (Mayr and Rand); known only from Port Moresby area.

NESTING [Saucer-shaped nest of grass and cobwebs decorated with bits of bark; placed in a horizontal fork of a tree up to twenty feet from ground; eggs two, greenish blue spotted with red-brown and grey; size 20 × 14 mm. Australian data.]

REMARKS The New Guinea birds were found in savannah country. Strangely enough, the species has not been found in the extensive savannahs of south New Guinea. Though called the brown flycatcher in Australia, this name gives little idea of the colour while the white in the tail is distinctive.

***Microeca flavigaster* (Gould)**

Lemon-bellied Flycatcher. Length $4\frac{1}{2}$–5 in. Adults: upperparts light greenish olive to (in a subspecies) dark olive; throat yellowish white shading to pale yellow of breast (sometimes tinged grey) and abdomen; iris dark brown; bill black, paler at base of mandible; feet black. Male wing 77 (69–81) mm, tail 47 mm, culmen 14 mm, tarsus 14 mm. Female wing 74 mm.

RANGE Northern Australia, south New Guinea and locally in north New Guinea; sea level to 2,200 and 4,800 ft.

SUBSPECIES IN NEW GUINEA Three:

a) *terraereginae* (Mathews); north Queensland and south-eastern New Guinea from Yule Island east to Kemp Welch River; sea level to 2,200 ft; pale base of bill conspicuous.
b) *tarara* (Rand); south New Guinea (Wassi Kussa River to Mimika River); like *terraereginae* but darker olive on upperparts and paler yellow on underparts.
c) *laeta* (Salvadori); locally in north New Guinea: Wandammen on west coast of Geelvink Bay, and Astrolabe Bay and Victor Emanuel Mountains at 4,800 ft; very similar to *tarara*, but yellower and bill more blackish.

NESTING [A cup of fine bark bound with cobweb built in a fork of a savannah tree; a single pale blue egg with well distributed brown spots; size 19 × 14 mm. Australian data.]

REMARKS In south-eastern New Guinea this was a common bird in the savannah, sitting up straight on some perch, especially a dead branch, and darting out after flying insects.

### *Microeca griseoceps* (De Vis)

Yellow-footed Microeca Flycatcher. Length 4½–5 in. Adults: top of head, neck, and sides of head ashy grey to olive-grey; back and upper tail-coverts greenish olive to darker olive; lores and eye-ring whitish; chin and throat whitish; breast, abdomen, and under tail-coverts yellow to very pale yellow; wing and tail feathers brownish black, edged with colour of the back; iris dark brown; bill, upper mandible black, lower yellow; feet yellow. Male wing 70 (to 80) mm, tail 50 mm, culmen 14 mm, tarsus 15 mm. Female wing 68 mm.

RANGE Mountains of New Guinea up to 5,000 ft and also lowlands of south New Guinea.

SUBSPECIES Three very similar ones:

a) *griseoceps* (De Vis); eastern New Guinea and Herzog Mountains and lowlands of south New Guinea; crown ashy grey, back greenish olive.
b) *poliocephala* (Reichenow); Cyclops, Victor Emanuel, Mamberamo, and Weyland Mountains; like *griseoceps* but crown darker, back darker, underparts paler.
c) *occidentalis* (Rothschild and Hartert); Arfak Mountains; like *poliocephala* but crown brownish tinged.

REMARKS A rather uncommon bird of the forest substage and taller second growth where it sits up rather straight and quietly. Its song is a fine trill which changes in volume.

***Microeca flavovirescens* (Gray)**

Olive Microeca Flycatcher. Length 5–5½ in. Adults: upperparts olive-green; sides of head like back but with a grey line above lores and eye-ring yellow; underparts yellow with flanks more olive; wing and tail blackish brown, the quills edged with colour of back; iris dark brown; bill blackish, mandible yellow; feet pale brown. Male wing 75 (75–82) mm, tail 59 mm, culmen 16 mm, tarsus 15 mm. Female wing 72 mm.

RANGE New Guinea lowlands, occasionally up to 5,000 ft, Aru Islands and western satellite islands (Misol, Batanta, Waigeu and Japen).

SUBSPECIES Two very similar ones:

a) *flavovirescens* (Gray); Aru Islands and south New Guinea in Fly River area.
b) *cuicui* (De Vis); range as for the species except range of *flavovirescens*, and like it but more deep yellow underparts and brighter upperparts.

NESTING About five feet up in a slender sapling in the open forest undergrowth, so that the nest was completely exposed. Nest of moss lined with wild pig hair; eggs two.

REMARKS The olive microeca was not uncommon, living in the trees and shrubs in the lower part of the forest. Like others of the genus, it is rather inactive and quiet, sitting up straight on a twig or small branch.

***Microeca papuana* (Meyer)**

Papuan Microeca Flycatcher. Length 4½–5 in. Adults: upperparts olive-green; wing and tail quills brownish black, edged with colour of back; side of head green, eyelid feathers yellowish; underparts deep yellow, slightly more olive on flanks; iris dark brown; bill black; feet yellow. Wing 75 mm, tail 48 mm, culmen 14 mm, tarsus 19 mm.

RANGE Mountains of New Guinea (Vogelkop and Central Ranges, to south-eastern New Guinea); 4,800 to 9,500 ft.

REMARKS Usually the papuan flycatcher is found in the lower trees and saplings of the forest, but sometimes it goes into the treetops. It is a rather plump, quiet and inactive bird, sitting up straight on a twig or small branch, looking about for passing insects, then darting out for them, then moving on to another perch. If nothing appears, the bird may shift to another perch, and so pass through the forest. Occasionally as it perches the wings and tail are fluttered.

**Monachella**

River Flycatcher. This monotypic genus is very distinctive in colour pattern and habitat. The juvenile plumage is spotted.

### *Monachella mulleriana* (Schlegel)

River Flycatcher. Length 5½–6 in. Adults: crown and centre of forehead black with a large white patch on each side of forehead; back pale ashy grey changing to white on rump and upper tail-coverts; wings and tail black; side of head white with black line from gape to eye; underparts white. Wing 93 mm, tail 56 mm, culmen 17 mm, tarsus 16 mm.

RANGE New Guinea and New Britain; lowlands up to 6,000 ft.

SUBSPECIES IN NEW GUINEA One, *mulleriana* (Schlegel).

NESTING A shallow cup on a branch; the base of rootlets and mud forms a hard, adobe-like foundation which is carried around the branch on which the nest is saddled; on this foundation is a wide, shallow cup of blackish rootlets.

REMARKS This black and white flycatcher is a conspicuous bird found by rivers and sizable streams where it perches on rocks, tree trunks and branches overhanging the water. It is sometimes found singly, more often in little parties of three to six birds, and it catches its insect food in the air.

### Petroica

Robin Flycatchers. Two species, lengths 4½–5½ in., in New Guinea, both at high altitudes in the mountains, one is a tree bird, one lives among rocks. The bill is small, as high as it is wide, and thus rather different from most other flycatchers.

### Key to *Petroica* Species

Throat and breast black: *P. bivittata.*
Throat and breast slaty with a red patch: *P. archboldi.*

### *Petroica bivittata* (De Vis)

Forest Robin Flycatcher. Length 4½ in. Adults: upperparts dull black with small, white patch in middle of forehead, a little semi-concealed white in bases of wing quills, white edgings on some inner secondaries, and white tips to outer tail feathers; sides of head, throat and breast dull black; abdomen and under tail-coverts white; iris dark brown; bill black, inside of mouth orange; feet black, underside of toes yellow. Male wing 76 mm, tail 50 mm, culmen 13 mm, tarsus 19 mm. Female wing 73 mm.

RANGE High mountains of New Guinea from 9,000 to 11,500 ft.
SUBSPECIES Two:

a) *bivittata* (De Vis); south-east New Guinea and Mt Hagen; outer pair of tail feathers with broad white tip and white outer web.

b) *caudata* (Rand); Snow Mountains; like *bivittata* but with white in tail much reduced.

REMARKS This is an uncommon bird which is found singly or in pairs in the canopy of the high mountain forest. It is a rather plump-looking and inactive bird sitting quietly or moving with slow and deliberate movements. It secures its food by flycatching, and moves from perch to perch through the forest rather than staying long periods in one place. Occasionally it sang a loud, deliberate 'dad-dad—'.

***Petroica archboldi* (Rand)**

Rock Robin Flycatcher. Length 5½ in. Adult male: upperparts slate-grey, paler on rump, darker on crown which is tinged pink, and with a forehead with semi-concealed white; lores black; side of head greyish black; throat grey tinged pink; upper breast slate-grey with a bright red spot about an inch across in centre; lower breast slate shading into paler grey flanks and whitish abdomen; upper wing-coverts black; wing quills black, the secondaries edged greyish white; tail feathers black with broad white tips to outer pair, and with a little white at base in outer web; iris dark; bill black; feet black with soles yellowish; wing 92 mm, tail 63 mm, culmen 14·8 mm, tarsus 23 mm. Female: similar but paler and with a faint indication of white in base of quills, more pronounced in immatures which are duller and lack red breast patch; wing 89 mm.

RANGE Known only from Mt Wilhelmina in the Snow Mountains from 12,800 to 13,700 ft.

REMARKS This red-breasted, alpine robin is restricted to a higher altitude than any other New Guinea bird. It lives not only above the timber line, but also above the upper edge of the alpine grassland. There, on the edges of bare rock slopes and cliffs and among the boulders of talus slopes on Mt Wilhelmina, the bird was common. It was usually seen in parties of three to six individuals. They were inactive, plump birds which sat about on rocks watching their surroundings, flying down to pick their prey (probably flies and spiders) from the ground or rock, and then flying back to the same or another perch. The open terrain makes them conspicuous, and, in addition, they are noisy birds, often giving loud chirps and harsh, scolding notes, so that they are hard to overlook. This striking species was discovered only in 1938 by an Archbold expedition.

**Tregellasia**

White-faced Flycatcher. The one New Guinea species, length 4½–5 in., resembles *Microeca* in being mostly yellow and olive, but it has a distinctive pattern of black and white on the head, and its tarsus and

toes are stronger and bill more robust. It seems to represent a stage between *Microeca, Poecilodryas* and the thicket-flycatchers.

***Tregellasia leucops* (Salvadori)**

White-faced Flycatcher. Length 4½–5 in. Adults: upperparts olive-green; underparts yellow washed with greenish on breast except for head which is variously patterned in black, white, grey and yellow as follows: (a) forehead black, crown and hind neck olive-grey with black lateral edges to crown, back half of face to front of eye black, front half white, throat yellow, chin whitish; (b) variations include a black line from eye to gape, crown and hind neck grey or blackish, white more extensive including forehead, side of face back to and around eye, and in one locality ear-coverts also white, white on throat may be more definite and extensive; iris brown; bill black with base of mandible pale yellow (or pale yellow with tip black); feet yellow. Male wing 80 (76–81) mm, tail 50 mm, culmen 16 mm, tarsus 20 mm.

RANGE North-eastern Australia and lower mountain slopes of New Guinea, usually from 2,500 to 6,000 ft; also in lowlands of south New Guinea.

SUBSPECIES IN NEW GUINEA Nine are recognized, differing chiefly in the varying patterns of black and white on the head, some of which are very distinct.

a) *leucops* (Salvadori); Vogelkop; forehead black; black encircles eye; black line eye to gape; large white spot between eye and nostril; chin and upper throat indistinctly washed whitish; crown greyish; bill mostly black.
b) *mayri* (Hartert); Wandammen and Weyland Mountains; like *leucops* but no black line from eye to gape; white spot in front of eye continuous with whitish chin.
c) *nigroorbitalis* (Rothschild and Hartert); southern slopes of Snow Mountains; like *mayri* but more white in upper throat, and crown blacker.
d) *heurni* (Hartert); Weyland Mountains and those on the upper Mamberamo River; differs from all the above in having forehead all white and continuous with a distinct white throat patch, and white in encircling eye.
e) *nigriceps* (Neumann); Telefomin Mountains and southern slopes of eastern Snow Mountains; like *heurni* but white of throat much reduced.
f) *melanogenys* (Meyer); hills of northern New Guinea from Cyclops Mountains to Huon Peninsula, and intergrading with *wahgiensis* eastward; very similar to *heurni*.
g) *wahgiensis* (Mayr and Gilliard); central and eastern New Guinea

(Kubor and Wahgi Mountains and Aroa River area); like *nigriceps* and *melanogenys* but white about eye more extensive, crown olive green and bill more extensively yellow.

h) *albifacies* (Sharpe); south-eastern New Guinea west to Port Moresby and Hydrographer Mountains; like *wahgiensis* but forehead black; maxilla black.

i) *auricularis* (Mayr and Rand); Oriomo River, south New Guinea; like *wahgiensis* but with a pure white throat; ear-coverts white (not black as in all above races).

NESTING [A neat, cup-shaped nest of fine material decorated outside with pieces of bark; placed low in a tree or shrub; eggs two, greenish white, with brown spots, especially about larger end. Australian data.]

REMARKS Though resembling a microeca flycatcher somewhat in having considerable green and yellow in its plumage, and in sometimes sitting upright and solitary on slender twigs in the lower part of the forest, this bird also frequently clings to the bark of the bases of forest trees and moves low through the undergrowth of the forest in company with a few others of its kind, and this suggests the habits of some of the members of the genus *Poecilodryas*.

### Poecilodryas

The four New Guinea species are forest birds, two of them living in the undergrowth or lower parts of the forest, one in the upper parts of the forest, and one in the mangroves. In part, at least, their feeding is flycatcher-like, but seems to represent a stage between typical and thicket-flycatchers.

### Key to *Poecilodryas* Species

1 Underparts partly yellow: *P. placens*.
No yellow in underparts: 2.

2 Throat and breast black: *P. albonotata*.
Throat and breast white or greyish: 3.

3 With a black patch on each side of breast: *P. hypoleuca*.
Without such black patch: 4.

4 Conspicuous white superciliary: *P. brachyura*.
Without white superciliary: *P. pulverulenta*.

### *Poecilodryas brachyura* (Sclater)

White-breasted Flycatcher. Length 5½–6 in. Adults: upperparts black, or crown black, back deep grey; wings black to blackish with white on outer edges of quills near middle of wing; tail black or blackish; side of head black with wide white line from nostril to over eye and side of nape; chin black, rest of underparts white; iris brown; bill black; feet

pale whitish pink. Male wing 85 mm, tail 54 mm, culmen 20 mm, tarsus 24 mm. Female wing 75 mm.

RANGE North-west and north New Guinea; sea level to 2,150 ft.

SUBSPECIES Three:

a) *brachyura* (Sclater); Vogelkop, Wandammen and Weyland Mountains; crown black, back deep grey.
b) *albotaeniata* (Meyer); Japen Island, Geelvink Bay; like *brachyura* but darker and with smaller black spot on chin.
c) *dumasi* (Ogilvie-Grant); northern New Guinea (Mamberamo to Sepik Rivers); like *brachyura* but upperparts black like head instead of deep grey.

REMARKS This is a bird found in the lower substage and undergrowth of the forest.

***Poecilodryas hypoleuca* (Gray)**

Black and White Flycatcher. Length 5–6 in. Adults: upperparts black to brownish black; wing with a conspicuous white mark on outer web of quills near middle of wing; side of head black with a white line from nostril to over eye and with a white area below eye; underparts from chin to under tail-coverts white with a black patch on each side of breast; iris brown; bill black; feet grey. Male wing 80 mm, tail 57 mm, culmen 21 mm, tarsus 20 mm. Female wing 72 mm.

RANGE Western Papuan Islands and New Guinea (except extreme east?); lowlands up to 1,000 ft.

SUBSPECIES Three, somewhat unsatisfactory ones. A good deal of individual variation:

a) *steini* (Stresemann and Paludan); Waigeu Island; like *hypoleuca* but browner above.
b) *hypoleuca* (Gray); Misol, Salawati, north-western New Guinea to head of Geelvink Bay and southern New Guinea east to Port Moresby; like *steini* but blacker above.
c) *hermani* (Madarasz); northern New Guinea (Mamberamo River to Morobe area); like *hypoleuca* but with broader white area above the black lores, larger white wing patch, and (?) deeper black above.

REMARKS The black and white flycatcher is a fairly common bird in the low substage and the undergrowth of the depths of the dark, lowland forests, where it was usually found singly. Sometimes the bird perches on a twig or branch, sometimes it clings to the side of a perpendicular vine or sapling. It is rather deliberate in actions, and sits quietly for some time. The tail is sometimes raised above the wings and then depressed. In feeding it is much like some monarcha flycatchers, picking insects

from twig or leaf and flying out to snatch an insect from a spray of leaves or on the wing. This bird has a loud, rather full, two- or three-note whistled song.

***Poecilodryas placens* (Ramsay)**

Olive-yellow Flycatcher. Length 5½–6 in. Adults: top of head and hind neck grey; back, rump and upper tail-coverts olive-green; wings and tail dusky, quills narrowly edged olive-green; side of head grey; chin olive-grey; rest of underparts bright yellow with a dark olive-green breast band; iris brown; bill black; feet yellowish brown. Male wing 90 mm, tail 52 mm, culmen 20 mm, tarsus 24 mm. Female wing 87 mm.

RANGE Probably all New Guinea lowlands, but known from only three widely separated areas: south coast of south-eastern New Guinea, Astrolabe Bay, and head of Geelvink Bay; lowlands up to 1,000 ft.

NESTING About two and a half feet up in a sapling the nest is built of moss (Stein).

REMARKS This is a rare and little-known species that lives near the ground in the undergrowth of the forest and is rather shy and retiring.

***Poecilodryas albonotata* (Salvadori)**

Black-throated Flycatcher. Length 7–7½ in. Adults: upperparts rather deep blue-grey, wings and tail more blackish and sometimes a small white mark on outer web of wing quills to give a small white spot near middle of wing; side of head black; throat and central part of breast black with a conspicuous white patch on each side of neck; sides of breast and flanks grey; lower breast and abdomen either all white or grey paler than back with white restricted to posterior abdomen depending on subspecies; iris brown; bill black; feet black. Male wing 110 mm, tail 80 mm, culmen 22 mm, tarsus 25 mm. Female wing 105 mm.

RANGE New Guinea mountains, from 4,500 to 9,000 ft.

SUBSPECIES Three:

a) *albonotata* (Salvadori); mountains of Vogelkop; lower breast and abdomen white.
b) *griseiventris* (Rothschild and Hartert); Weyland and Snow Mountains to Central Highlands; like *albonotata* but lower breast and abdomen grey, white posteriorly only.
c) *correcta* (Hartert); mountains of south-eastern New Guinea and Huon Peninsula; like *albonotata* but black of throat of lesser extent, white of underparts somewhat restricted and tinged buffy, and upperparts paler.

REMARKS The black-throated flycatcher is found in the upper substage

pale whitish pink. Male wing 85 mm, tail 54 mm, culmen 20 mm, tarsus 24 mm. Female wing 75 mm.

RANGE North-west and north New Guinea; sea level to 2,150 ft.

SUBSPECIES Three:

a) *brachyura* (Sclater); Vogelkop, Wandammen and Weyland Mountains; crown black, back deep grey.
b) *albotaeniata* (Meyer); Japen Island, Geelvink Bay; like *brachyura* but darker and with smaller black spot on chin.
c) *dumasi* (Ogilvie-Grant); northern New Guinea (Mamberamo to Sepik Rivers); like *brachyura* but upperparts black like head instead of deep grey.

REMARKS This is a bird found in the lower substage and undergrowth of the forest.

***Poecilodryas hypoleuca* (Gray)**

Black and White Flycatcher. Length 5–6 in. Adults: upperparts black to brownish black; wing with a conspicuous white mark on outer web of quills near middle of wing; side of head black with a white line from nostril to over eye and with a white area below eye; underparts from chin to under tail-coverts white with a black patch on each side of breast; iris brown; bill black; feet grey. Male wing 80 mm, tail 57 mm, culmen 21 mm, tarsus 20 mm. Female wing 72 mm.

RANGE Western Papuan Islands and New Guinea (except extreme east?); lowlands up to 1,000 ft.

SUBSPECIES Three, somewhat unsatisfactory ones. A good deal of individual variation:

a) *steini* (Stresemann and Paludan); Waigeu Island; like *hypoleuca* but browner above.
b) *hypoleuca* (Gray); Misol, Salawati, north-western New Guinea to head of Geelvink Bay and southern New Guinea east to Port Moresby; like *steini* but blacker above.
c) *hermani* (Madarasz); northern New Guinea (Mamberamo River to Morobe area); like *hypoleuca* but with broader white area above the black lores, larger white wing patch, and (?) deeper black above.

REMARKS The black and white flycatcher is a fairly common bird in the low substage and the undergrowth of the depths of the dark, lowland forests, where it was usually found singly. Sometimes the bird perches on a twig or branch, sometimes it clings to the side of a perpendicular vine or sapling. It is rather deliberate in actions, and sits quietly for some time. The tail is sometimes raised above the wings and then depressed. In feeding it is much like some monarcha flycatchers, picking insects

from twig or leaf and flying out to snatch an insect from a spray of leaves or on the wing. This bird has a loud, rather full, two- or three-note whistled song.

***Poecilodryas placens* (Ramsay)**

Olive-yellow Flycatcher. Length 5½–6 in. Adults: top of head and hind neck grey; back, rump and upper tail-coverts olive-green; wings and tail dusky, quills narrowly edged olive-green; side of head grey; chin olive-grey; rest of underparts bright yellow with a dark olive-green breast band; iris brown; bill black; feet yellowish brown. Male wing 90 mm, tail 52 mm, culmen 20 mm, tarsus 24 mm. Female wing 87 mm.

RANGE Probably all New Guinea lowlands, but known from only three widely separated areas: south coast of south-eastern New Guinea, Astrolabe Bay, and head of Geelvink Bay; lowlands up to 1,000 ft.

NESTING About two and a half feet up in a sapling the nest is built of moss (Stein).

REMARKS This is a rare and little-known species that lives near the ground in the undergrowth of the forest and is rather shy and retiring.

***Poecilodryas albonotata* (Salvadori)**

Black-throated Flycatcher. Length 7–7½ in. Adults: upperparts rather deep blue-grey, wings and tail more blackish and sometimes a small white mark on outer web of wing quills to give a small white spot near middle of wing; side of head black; throat and central part of breast black with a conspicuous white patch on each side of neck; sides of breast and flanks grey; lower breast and abdomen either all white or grey paler than back with white restricted to posterior abdomen depending on subspecies; iris brown; bill black; feet black. Male wing 110 mm, tail 80 mm, culmen 22 mm, tarsus 25 mm. Female wing 105 mm.

RANGE New Guinea mountains, from 4,500 to 9,000 ft.

SUBSPECIES Three:

a) *albonotata* (Salvadori); mountains of Vogelkop; lower breast and abdomen white.
b) *griseiventris* (Rothschild and Hartert); Weyland and Snow Mountains to Central Highlands; like *albonotata* but lower breast and abdomen grey, white posteriorly only.
c) *correcta* (Hartert); mountains of south-eastern New Guinea and Huon Peninsula; like *albonotata* but black of throat of lesser extent, white of underparts somewhat restricted and tinged buffy, and upperparts paler.

REMARKS The black-throated flycatcher is found in the upper substage

and the lower treetops of the mountain forests. It sits rather straight on branches, flies out after passing insects and then flies to another perch. One bird seen sitting on a bamboo shoot over the trail, flew to take a caterpillar from a leaf, and then beat it against a perch before swallowing it.

### *Poecilodryas pulverulenta* (Bonaparte)

Mangrove Flycatcher. Length 5½–6 in. Adults: upperparts grey; crown fuscous; forehead and band through eye to ear-coverts black; wings blackish, tail black, outer quills with basal half or more white; underparts white with a pale grey breast band and flanks; iris dark brown; bill black; feet black. Wing 87 mm, tail 65 mm, culmen 20 mm, tarsus 23 mm.

RANGE South New Guinea, locally in north New Guinea, Aru Islands, and Australia.

SUBSPECIES IN NEW GUINEA Two:

a) *pulverulenta* (Bonaparte); southern New Guinea from near East Cape to Utanata (near Mimika) River, also Geelvink Bay and Humboldt Bay east to middle Sepik.

b) *leucura* (Gould); Aru Islands and Cape York Peninsula.

NESTING [A compact cup-shaped nest placed in a fork of a horizontal mangrove branch, made of strips of bark bound with cobweb and decorated externally with long pieces of bark; eggs two, greenish grey with brown and grey spots; size 18 × 15 mm. Australian data.]

REMARKS A bird found in the mangroves where it is locally common.

### Key to Thicket-flycatchers

1 Back grey or bluish grey: 2.
Back black: 4.
Back olive-green: *Pachycephalopsis hattamensis.*
Back brown or greyish olive: *Heteromyias albispecularis.*

2 Throat white contrasting with grey of breast: *Pachycephalopsis poliosoma.*
Throat grey like breast: 3.

3 Underpart bluish slate, much like back: *Peneothello cyanus.*
Underparts grey, paler than back: *Peneothello cryptoleucus.*

4 Inner secondaries with much white: *Peneothello sigillatus.*
Inner secondaries black: *Peneothello bimaculatus.*

### *Peneothello sigillatus* (De Vis)

White-winged Thicket-flycatcher. Length 5½–6 in. Adults: black with conspicuous white area in inner secondaries, and, in one subspecies,

with a conspicuous white patch on each side of breast; iris brown; bill black; feet black. Male wing 91–106 mm, tail 63–78 mm, culmen 16 mm, tarsus 27–31 mm. Female wing 86–99 mm, varying with the subspecies.

RANGE High mountains of central and eastern New Guinea, from 7,000 to 12,000 ft.

SUBSPECIES Four:

a) *sigillatus* (De Vis); south-eastern New Guinea west to Central Highlands; no white in breast, white inner secondaries tipped black; male wing 94–100 mm.
b) *hagensis* (Mayr and Gilliard); highlands of Mt Hagen; like *sigillatus* but white inner secondaries not tipped with black.
c) *saruwagedi* (Mayr); Huon Peninsula; like *sigillatus* but more black on tips of white, inner secondaries and size smaller; male wing 92–96 mm.
d) *quadrimaculatus* (van Oort); Snow Mountains; like *hagensis* but with a conspicuous white patch on each side of breast; male wing 101–6 mm; (a sub-adult from Victor Emanuel Mountains may belong here).

NESTING A firm, neat cup nest is made of filmy fern and placed in a bulky foundation of loose, green moss in a fork of a branch. Young, two (one nest).

REMARKS A common bird in the forest, the forest edge, and out into the clumps of trees and shrubs above the timber line. Singly, or in twos or threes, the birds move slowly about low in the forest, stopping here and there. The bird is often seen as it clings to the side of a tree trunk or sapling a few feet above the ground, pecking insects within reach or as it flies down to alight and seize prey from the ground, and then returns to a perch.

### *Peneothello cryptoleucus* (Hartert)

Grey Thicket-flycatcher. Length 5½–6 in. Adults: upperparts blue-grey, crown darker; wing and tail black; underparts paler and greyer than back without a blue tinge and in one race abdomen greyish white; undersurface of wing greyish black with basal part of inner web of inner primaries white, giving a white patch; iris brown; bill and feet black. Male wing 85 mm, tail 65 mm, culmen 16 mm, tarsus 28 mm. Female wing 79 mm.

RANGE Arfak and Weyland Mountains, 5,000 to 7,000 ft.

SUBSPECIES Two:

a) *cryptoleucus* (Hartert); Arfak Mountains.

b) *albidior* (Rothschild); Weyland Mountains; like *cryptoleucus* but abdomen paler more greyish white.

REMARKS This bird lives near the ground in the undergrowth of the forest. So similar is this species to *P. cyanus* that it was only described in 1930 from specimens that had been in museums for decades. The most obvious characters for separating it are the paler grey (without bluish tint) underparts and the white patch at the base of the inner primaries seen on the under wing of *P. cryptoleucus*.

***Peneothello cyanus* (Salvadori)**

Slaty Thicket-flycatcher. Length 5½–6 in. Adults: generally bluish grey or bluish slate, darker and more blackish on crown and side of head; wings and tail black; under wing without whitish area on inner web of primaries; iris brown; bill black; feet black. Male wing 92 (91–97) mm, tail 66 mm, culmen 18 mm, tarsus 25 mm. Female wing 85 mm.

RANGE New Guinea mountains, from 3,200 to 9,000 ft.

SUBSPECIES Three very similar ones:

a) *cyanus* (Salvadori); Arfak Mountains; a rather pale form.
b) *atricapilla* (Hartert and Paludan); Wandammen, Weyland, Snow, Cyclops Mountains and Telefomin Mountains; like *cyanus* but darker and crown more blackish.
c) *subcyaneus* (De Vis); Central Highlands, Huon Peninsula, and south-eastern New Guinea; like *atricapilla* but crown less blackish.

NESTING A round deep cup nest is made of fine rootlets lined with dried fern fronds and set in a thick foundation of green moss placed in an upright fork of a sapling; a single egg, light olive with spots of reddish brown most plentiful about the larger end.

REMARKS This is a rather shy bird found in the forest undergrowth, and most often seen as it flies up, with a whirring of wings, to sit on a low perch and look at the intruder for a few moments before flying away into the undergrowth, where its song is heard, rapidly whistled and rising at the end.

***Peneothello bimaculatus* (Salvadori)**

White-rumped Thicket-flycatcher. Length 5–5½ in. Adults: generally black with lower rump and upper tail-coverts white and a white patch on each side of breast; some subspecies with abdomen or lower breast and abdomen white; iris brown; bill black; feet black. Male wing 88 mm, tail 54 mm, culmen 18 mm, tarsus 23 mm. Female wing 80 mm.

RANGE Main mountain ranges of New Guinea, from 1,900 to 3,200 ft.

SUBSPECIES Two well marked ones:

a) *bimaculatus* (Salvadori); Arfak, Weyland and Snow Mountains and

southern slopes of mountains of south-eastern New Guinea; abdomen white.

b) *vicarius* (De Vis); north slopes of mountains of south-eastern New Guinea and Huon Peninsula; like *bimaculatus* but abdomen black.

REMARKS Though widely distributed in the mid-mountains, this seems an uncommon species.

***Heteromyias albispecularis* (Salvadori)**

Ground Thicket-flycatcher. Length 6–7 in. Adults: two very different types of plumage, depending on locality, as follows: (a) top of head and hind neck black; conspicuous white line from over eye to side of nape; chin and side of head black except for a white bar from white of throat to eye; throat and abdomen white, breast and sides of body grey, flanks and under tail-coverts more or less ochraceous; back greyish olive to brownish olive; central tail feathers and inner secondaries like back or browner; other wing and tail quills black edged with colour of back, the wing quills with a grey or white central area making a more or less conspicuous patch in centre of folded wing; or (b) with black of head replaced by grey and white superciliary replaced by pale grey: iris dark brown; bill black or grey (pale at tip in some specimens); feet whitish. Male wing 100 (95–102) mm, tail 65 mm, culmen 21 mm, tarsus 35 mm. Female wing 91 mm.

RANGE North Queensland and mountains of New Guinea, from 4,800 to 8,000 ft.

SUBSPECIES Five:

a) *albispecularis* (Salvadori); Vogelkop; top of head, hind neck, chin, and ear-coverts dark grey; pale line from over eye to side of nape pale grey; male wing 95 mm.

b) *rothschildi* (Hartert); Weyland and western Snow Mountains; top of head, hind neck, lores, ear-coverts and chin black instead of grey; conspicuous line from over eye to side of nape white; back olive-brown; ochraceous in flanks extensive; male wing 98 mm.

c) *centralis* (Rand); northern slopes of central ranges from Idenburg River to Central Highlands; like *rothschildi* but upperparts more greyish olive; flanks with less ochraceous; male wing 100 mm.

d) *armiti* (De Vis); Herzog Mountains and south-eastern New Guinea; like *centralis* but forehead greyish, crown brownish black; back greenish olive; upper tail-coverts more reddish brown; male wing 102 mm.

e) *atricapillus* (Mayr); Saruwaged Mountains; like *armiti* but top of head deep black and tail darker rust-brown; male wing 97 mm.

NESTING A rather untidy cup-shaped nest is placed three to seven feet

up in a fork of a small sapling in the undergrowth in the shady, mossy forest. The nest is composed of twigs, grass and moss and lined with a cup of fine fern rootlets; one young, fed by both parents. An adult gave the broken-wing injury feigning on the ground when its nest was disturbed.

REMARKS This is a bird of the dark forest floor and undergrowth where it is shy, retiring, and rather slow moving. Its food includes insects and earthworms. It has a whistled song and a distinctive, two-note alarm or scolding call. The bird is often not seen until it flies up to perch, six to ten feet above the ground, on a sapling or a low tree.

***Pachycephalopsis hattamensis* (Meyer)**

Green Thicket-flycatcher. Length 6 in. Adults: top of head and hind neck grey; back olive-green; upper tail-coverts and tail rusty brown; upper wing-coverts olive-green to reddish brown; wing quills fuscous edged externally with reddish brown to olive-brown; side of head like crown, with or without a pale area in lores; chin, upper throat, and malar area white, rest of underparts yellowish olive, clearer and more yellow on abdomen; iris pale brown or whitish; bill black; feet grey. Male wing 100 mm, tail 54 mm, culmen 20 mm, tarsus 30 mm. Female wing 94 mm.

RANGE Snow Mountains to Vogelkop, from 2,500 to 5,400 ft.

SUBSPECIES Three rather similar ones:

a) *hattamensis* (Meyer); Vogelkop.
b) *ernesti* (Hartert); Wandammen Mountains; like *hattamensis* but breast darker green and washed with grey anteriorly.
c) *axillaris* (Mayr); Snow and Weyland Mountains; like *hattamensis* but paler below and with axillaries more yellowish, less greyish.

NESTING Well concealed nest of moss, about two feet up in a liana.

REMARKS This is another of the rare, little known New Guinea birds which lives in the low undergrowth of the forest where the soil is wet and ferns and tall herbs are luxuriant (Stein).

***Pachycephalopsis poliosoma* (Sharpe)**

White-throated Thicket-flycatcher. Length 6–6½ in. Adults: generally grey with a white or pale grey area of variable extent on chin and upper throat; side of head grey to black, crown often darker than back, sometimes tinged brown; wings, upper tail-coverts and tail greyish-black to brown; underparts paler grey than back, breast sometimes tinged brownish, abdomen often whitish, under tail-coverts grey to buffy; iris grey or buffy; bill black; feet slate-blue. Male wing 103

(97–108) mm, tail 66 mm, culmen 21 mm, tarsus 32 mm. Female wing 96 mm.

RANGE Weyland and Snow Mountains, eastward on the main ranges to Huon Peninsula and south-eastern New Guinea, from 2,550 to 7,000 ft.

SUBSPECIES Seven:

a) *albigularis* (Rothschild); Weyland and, surprisingly, Telefomin Mountains; chin and upper throat white; wings and tail greyish black; abdomen little paler than breast.

b) *approximans* (Ogilvie-Grant); south slope of Snow Mountains; like *albigularis* but white on throat smaller.

c) *balim* (Rand); Balim and Bele Rivers, north Snow Mountains; like *approximans* but abdomen more whitish, upper tail-coverts and tail more brownish; a brownish tinge on breast and crown and under tail-coverts buffy; male wing 108 mm.

d) *idenburgi* (Rand); slopes above the Idenburg River north of Snow Mountains; like *balim* but smaller white throat patch; wing and tail quills edged with darker, richer brown; crown and sides of head blacker; male wing 102 mm.

e) *hunsteini* (Neumann); Hunstein Mountains of Sepik River; like *balim* but white restricted to chin and tinged buffy; breast and abdomen darker and crown blacker; male wing 107 mm.

f) *poliosoma* (Sharpe); south-east New Guinea and Herzog Mountains; like *balim* but posterior part of white throat patch washed brownish; abdomen greyer, and under tail-coverts grey not buffy; male wing 103 mm.

g) *hypopolia* (Salvadori); Saruwaged Mountains; like *hunsteini* but slightly paler and smaller; male wing 97 mm.

REMARKS This is a shy, retiring bird found on the forest floor. It flies from thicket to thicket ahead of one and often gives a harsh cry when disturbed. One, watched for some time, hopped about on the ground, flew up into the shrubbery and then flew a short distance to another patch of leafy shrubbery.

## Family Pachycephalidae
## *Shrike Flycatchers and Whistlers*

These are rather stout birds found in the trees, and some of them are common, conspicuous birds. Most of them are rather slow moving birds seeking their insect food among branches and twigs. Some, however, vary their diet with fruit, and one genus, *Rhagologus*, is a fruit eater.

Some of the smaller species may be confused with thicket-flycatchers, some of the larger species vaguely resemble some bowerbirds and the species with strongly hooked bills suggest a relationship with shrikes.

A synopsis of the genera, rather than a formal key, seems advisable.

### Synopsis of Genera of *Pachycephalidae*

1 PACHYCARE One species; length 5 in.; underparts and face all yellow; back grey; the only genus in the group so coloured.

2 RHAGOLOGUS One species; length 6–6½ in.; underparts dull, greyish olive, throat and breast obscurely spotted and mottled with grey, or whole underparts more or less conspicuously mottled and spotted with whitish; upperparts dull, deep brownish and greyish with or without light streaks; the only genus in the group so coloured.

3 PACHYCEPHALA Fourteen species; length 5½–7½ in.; colour and pattern various but unlike either of the above.

4 MYIOLESTES One species; length 6½–7½ in.; very like a large *Pachycephala* with a relatively larger, longer bill; bird from New Guinea proper very dull-coloured; brownish or greyish olive above and ochraceous or greyish brown below; some island races are very like large *Pachycephala griseiceps*.

5 COLLURICINCLA One species; length 9 in.; plumage predominantly ashy grey above, paler grey below; a savannah bird.

6 PITOHUI Six species; length 8–11 in.; male in one species black or slaty grey; all others predominantly fulvous brown to red-brown, some with head and sometimes breast, wings and tail black or with head grey; one with back greyish.

### *Pachycare*

A monotypic New Guinea genus with the single species very distinctly coloured.

### *Pachycare flavogrisea* (Meyer)

Golden-faced Pachycare. Length 5 in. Adult male: whole upperparts, side of head, and forehead yellow or orange-yellow; crown and hind neck grey edged with a black line in front and on sides, which expands into a black patch on side of neck; back, wing-coverts, rump and tail feathers grey like crown; lateral tail feathers with broad, black subterminal and narrow, grey terminal marks; wing feathers black, edged externally with grey and inner secondaries with white spots at tip; iris brown; bill black; feet flesh colour; wing 66 mm, tail 38 mm, culmen 18 mm, tarsus 21 mm. Female: similar but with a blackish spot on ear-coverts and black on forecrown reduced; wing 63 mm.

RANGE Mountains of New Guinea, from 2,500 to 5,000 ft.

SUBSPECIES Four, based on brightness of yellow, a characteristic that is affected by museum age of specimens:

a) *flavogrisea* (Meyer); Vogelkop, Wandammen and (?) Sepik Mountains; a moderately bright bird.
b) *subaurantia* (Rothschild and Hartert); Snow and Telefomin Mountains; a brighter, more orange-yellow bird.
c) *subpallida* (Hartert); south-eastern New Guinea to Huon Peninsula. In the Sepik area (Hunstein Mountains, etc.), where this pale form grades into the bright *subaurantia*, the birds are very like the distant Arfak *flavogrisea*.
d) *randi* (Gilliard); north slope of Snow Mountains; most like *subaurantia* but yellow richer and more orange.

REMARKS The pachycare is a rather conspicuous, active bird in the lower treetops and the substage of the forest, where it often goes in pairs and gleans among the twigs and leaves for its food of insects, and gives a rather loud, full song recorded as 'whit-whit—'.

### Rhagologus

A monotypic New Guinea endemic genus, with a very distinct colour pattern.

### *Rhagologus leucostigma* (Salvadori)

Mottled Whistler. Length 6–6½ in. Adult male: a greyish, olive and brownish bird obscurely barred and mottled in varying degrees, best described under the subspecies; iris brown; bill black; feet slaty blue; wing 90 mm, tail 65 mm, culmen 17 mm, tarsus 21 mm. Female: much more heavily patterned than male; wing 86 mm.

RANGE Main mountain ranges of New Guinea, from 4,000 to 8,000 ft.

SUBSPECIES Three:

a) *leucostigma* (Salvadori); Vogelkop. Male: top of head grey, feathers broadly edged with olive and with whitish spots on forehead, while pale shaft streaks show on the rest of crown; hind neck, back and rump brownish olive, the feathers of the back of neck with whitish shaft streaks usually enlarging near tip of feather into small spots and the upper back has a few obscure spots; lores white; side of head and chin dull rufous, the feathers with black tips; breast and flanks yellowish white, each feather edged or barred with dusky; under tail-coverts rufous; upper wing-coverts brownish olive, the greater series edged with blackish submarginal and brownish marginally; remiges edged brownish olive; rectrices fuscous washed olive. Female like male but with more pronounced markings on forehead and crown; wider and more plentiful whitish streaks on hind neck

and foreback; the distinct rusty streaks outlined in black on the lower back; the much brighter rufous side of head and chin; the more distinct, dark markings on a lighter ground colour on the underparts, and the brighter, more rufous edgings to wing quills and their greater coverts.

b) *novus* (Rand); Weyland and western Snow Mountains. Male: like *leucostigma* but upperparts darker and with markings reduced or almost absent; edgings of wing quills more olive; rufous of head paler; underparts darker with markings less distinct. Female: like *leucostigma* but upperparts darker with markings less plentiful and narrower; paler rufous on head; and slightly darker underparts.

c) *obscurus* (Rand); south-eastern New Guinea to Huon Peninsula, Central Highlands and the eastern Snow Mountains (Idenburg River and Mt Goliath). Male much plainer and duller than preceding: top of head grey, feathers with indistinct darker margins; back dark brownish olive, unmarked; greater wing-coverts edged with grey; side of head dusky olive-grey with faint mottling; throat grey, feathers edged with black, grading into dark greyish olive of breast and abdomen. Female like *novus* but underparts paler and not buffy tinged.

REMARKS This is a bird found in the undergrowth and low trees of the forest. Unlike its near relatives this bird eats fruit alone. When feeding it flits about in a fruit-bearing tree along with certain honeyeaters and flowerpeckers, and it may then sit quietly on a low perch for some time.

**Key to *Pachycephala* Species (Adults)**

1 Abdomen with yellow: 2.
Abdomen without yellow: 7.

2 Black breast band present, throat white: 3.
No black breast band: 6.

3 Back yellow: *P. aurea* (male, female).
Back olive-green: 4.

4 Yellow collar on hind neck: 5.
No yellow collar on hind neck: *P. soror* (male).

5 Lower breast and abdomen with red-brown area: *P. schlegeli* (male).
Lower breast and abdomen clear yellow: *P. pectoralis* (male).

6 It is impractical to key the following three species and the females of the three species which have crown grey (occasionally brownish), back olive, throat white (sometimes mottled or obscurely streaked), and lower breast and abdomen yellow: *P. pectoralis* (female), *P. soror* (female), *P. schlegelii* (female), *P. lorentzi* (male and female), *P. meyeri* (male and female), *P. griseiceps* (male and female, some subspecies).

7 A red-brown patch on nape area: *P. rufinucha.*
No red-brown patch on nape area: 8.
8 Throat white, rest of underparts rufous: *P. hyperythra.*
No rufous in underparts: 9.
9 Throat and upper breast black, rest of underparts white: *P. monacha* (male).
Throat and upper breast grey, rest of underparts white: *P. monacha* (female).
Not so: 10.
10 Underparts white except for black breast band: *P. rufiventris* (male).
Underparts white or whitish except for grey breast band: *P. rufiventris* (female).
Underparts whitish except for light brown breast band and obscure streaks: *P. griseiceps* (one subspecies).
Underparts whitish except for pale ochraceous wash: *P. phaionotum.*
Underparts whitish, more or less washed with grey: *P. modesta.*
Underparts generally dark, dusky brown: *P. tenebrosa.*

***Pachycephala pectoralis* (Latham)**

Golden Whistler. Length 6–6½ in. Adult male: top and sides of head and neck black bordered posteriorly by a narrow, yellow band; rest of upperparts olive-green except for tail which is black in some subspecies, and wings which are fuscous to black with feathers margined with greenish or greyish; chin and throat white bordered posteriorly by a black band which joins black of side of neck; rest of underparts clear, bright yellow which joins yellow band of foreback; iris brown or red; bill black (brown in female of one race); feet black or slate; wing 87 (to 97) mm, tail 65 mm, culmen 19 (to 24) mm, tarsus 25 mm. Female: quite different from male, without black and more conspicuously variable; upperparts olive-green, crown grey or brownish, or upperparts bright brownish olive; underparts, throat white to grey, obscurely mottled, with greyish or buffy band on upper breast and rest of underparts yellow.

RANGE Java to Pacific Islands, Australia and Tasmania; in New Guinea in lowlands (one subspecies only in mid-mountains) and satellite islands.

SUBSPECIES In all some seventy-two are recognized, of which six occur in the New Guinea area:

a) *balim* (Rand); north slopes of Mt Wilhelmina from 4,500 to 7,700 ft (the only mid-mountain subspecies). Male: back olive-green, tail black. Female: crown and side of head dark brownish, back olive-green, tail washed green, breast band greyish buff, abdomen deep bright yellow. Wing 92 mm.
b) *spinicauda* (Pucheran); Cape York, islands in Torres Straits and

south New Guinea (Merauke to Yule Island and (?) Milne Bay); like *balim* but male with lighter green back and paler underparts; female much paler, above and below, wing quills edged pale grey in both sexes. Wing 87 mm, culmen 19 mm.

c) *fergussonis* (Mayr); Fergusson Island, D'Entrecasteaux Archipelago; like *spinicauda* but male larger, wing 95 mm.

d) *collaris* (Ramsay); Teste Island, Conflict group, Bonvouloir group and Egum Island, all east of New Guinea; like *spinicauda* but with tail green and bill much longer; female with upperparts rather bright brownish olive, breast band bright rusty, abdomen bright yellow, wing quills edged brown. Wing 95 mm, culmen 24 mm.

e) *misimae* (Rothschild and Hartert); Misima Island and Deboyne group, Louisiade Archipelago; very like *collaris* and perhaps not separable.

f) *rosseliana* (Hartert); Rossel Island, east of New Guinea; like *collaris* but female with bill brown (not black as in all other forms) and a tinge of buff on yellow underparts; wing 96 mm, culmen 24 mm.

NESTING [The nest is a cup-shaped structure of rootlets bound with cobwebs, placed in fork of a branch; eggs buff, spotted; size 23 × 17 mm. Australian data.]

REMARKS This widespread species lives in one area in mangrove swamps and other coastal vegetation and in another area it lives in the mid-mountains in dry forest. In the mangroves, it is sometimes difficult to find among the leaves, even when it is continually giving its loud song.

### *Pachycephala soror* (Sclater)

Sclater's Whistler. Length 6 in. Adult male: top and side of head and neck black; rest of upperparts olive-green; wing quills black edged with greyish; tail black, more or less washed with green; throat white; a broad black breast band joins black of side of neck; lower breast, abdomen and under tail-coverts bright yellow; iris brown or red-brown; bill brown to black; feet grey; wing 92 (85–96) mm, tail 65 mm, culmen 17 mm, tarsus 22 mm. Female: upperparts olive-green, crown either greyer or browner than back; throat white, rest of underparts yellow with a dusky breast band; wing 85 mm.

RANGE Main mountain ranges of New Guinea and Goodenough Island, from 2,500 to 5,800 ft.

SUBSPECIES Four very similar ones:

a) *soror* (Sclater); Vogelkop; tail feathers black edged with green.

b) *klossi* (Ogilvie-Grant); Weyland, Snow and Telefomin Mountains intergrading with *bartoni* in Huon Peninsula and Central Highlands; tail feathers black.

c) *bartoni* (Ogilvie-Grant); mountains of south-eastern New Guinea; tail feathers green with black shaft streaks; wing 85–92 mm.
d) *remota* (Mayr and Van Deusen); Goodenough Island; like *bartoni* but male slightly richer yellow below and larger; wing 96 mm.

REMARKS This mid-mountain species is very similar in habitat preference and habits to the higher altitude *P. schlegelii*.

***Pachycephala schlegelii* (Schlegel)**

Schlegel's Whistler. Length 6–6½ in. Adult male: top and sides of head and nape black; a band of yellow on hind neck; back dark olive-green; tail black; wings black, quills more or less edged externally with olive; throat white; breast with a wide black band which is confluent with black of nape; rest of underparts yellow with an orange area on lower breast and abdomen; iris brown; bill black; feet grey; wing 85 (to 94) mm, tail 57 mm, culmen 15 mm, tarsus 24 mm. Female: top and sides of head and nape grey; back olive-green; wings and tail black, edged or washed with green; throat white or whitish obscurely mottled with dusky and shading posteriorly into plain grey followed by a band of olive-green; rest of underparts yellow tinged olive in flanks; slightly smaller than male.

This species increases in size with altitude, thus in the Snow Mountains, males from 5,800 ft have wing of 87 mm, from 9,000 ft, 90–94 mm.

RANGE Mountains of New Guinea, from 4,500 to 12,000 ft.

SUBSPECIES Four very similar ones are recognized:
a) *schlegelii* (Schlegel); Vogelkop and Wandammen Mountains.
b) *viridipectus* (Hartert and Paludan); Weyland and Snow Mountains.
c) *cyclopum* (Hartert); Cyclops Mountains.
d) *obscurior* (Hartert); south-eastern New Guinea to Huon Peninsula, Central Highlands, Sepik and Telefomin Mountains.

REMARKS This is a common bird in the lower treetops and the substage trees of the forest. Singly, or in pairs, this stolid, slow-moving bird goes its uneventful way, sitting quietly looking about for insects on twigs and leaves, flying or hopping short distances and then repeating the process. Its song is loud and emphatic.

***Pachycephala aurea* (Reichenow)**

Yellow-backed Whistler. Length 6–6½ in. Adults: head and neck all round and breast black except for a white patch in middle of throat; back, rump, upper tail-coverts, lower breast, abdomen and under tail-coverts clear yellow to orange-yellow; wings and tail black; iris brown;

bill black; feet dark grey. Wing 88 mm, tail 63 mm, culmen 20 mm, tarsus 24 mm.

RANGE Foothills up to 2,000 ft in south-east New Guinea, southern slopes of Snow Mountains, Weyland Mountains, and upper Ramu River.

REMARKS Apparently this is a rare bird found in second growth along rivers. This species, with both sexes bright, or cock-feathered, contrasts with the related species *P. lorentzi* in which both sexes are dull, hen-feathered.

***Pachycephala lorentzi* (Mayr)**

Lorentz's Whistler. Length 6–6½ in. Male and female alike and very similar to female of *P. schlegelii* except for lacking the green band on the breast; iris brown; bill black; feet slaty. Male wing 86–95 mm, female wing 82–93 mm; depending on altitude, the larger birds from higher altitudes. One male measures: wing 90 mm, tail 68 mm, culmen 16 mm, tarsus 22 mm.

RANGE Snow and Telefomin Mountains from 5,800 to 12,000 ft.

REMARKS In behaviour and habitat, no difference was noted between this species and *P. schlegelii*, the female of which this species so closely resembles. In south-east New Guinea where *P. schlegelii* alone occurs, it ranges to the timber line at 12,000 ft. In the Snow Mountains, where both *lorentzi* and *schlegelii* occur, *schlegelii* ranges up to 9,000 ft only, while *lorentzi* alone lives in the highest forests. This species had long been represented in collections, but its separate identity was recognized only in 1941.

***Pachycephala meyeri* (Salvadori)**

Vogelkop Whistler. Length 5½–6 in. Adults: crown slaty grey; rest of upperparts olive-green, including the tail and the edgings of the fuscous wing quills; throat greyish white with faint dusky tips to the feathers; ear-coverts greyish brown; an obscure pale brownish breast band providing a gradual transition between throat and abdomen and under tail-coverts which are rather pale sulphur-yellow; under wing-coverts and axillaries very pale yellow; iris brown; bill black; feet grey. Wing 80 mm, tail 57 mm, culmen 15 mm, tarsus 20 mm.

RANGE Mountains of Vogelkop, from 3,200 to 4,800 ft.

REMARKS This is the only endemic species on the Vogelkop without a geographical representative in the rest of New Guinea. Both the male and female are dull-coloured and with *P. lorentzi* form a link between the bright coloured *P. schlegelii* group and the dull *P. griseiceps* group.

*P. meyeri* has been very rare in collections, and is so like a pale edition of the female of *P. schlegelii* that specimens have been misidentified in museums.

***Pachycephala griseiceps* (Gray)**

Grey-headed Whistler. Length 5½–6 in. Adults: most subspecies have yellow pigment in plumage, one lacks it. Either (a) crown brownish grey; back olive; tail washed with olive and wing quills edged olive; ear-coverts greyish olive or brownish, an indistinct whitish line from bill to over eye; throat white with streaking obsolete to fairly conspicuous; breast with or without a brownish wash, grading into pale yellow or yellowish white abdomen; or (b) without yellow pigment: upperparts brown; conspicuous brown breast band, streaking on white throat definite; abdomen white tinged brownish. Iris brown; bill black; feet grey. Male wing 87 (77–90) mm, tail 65 mm, culmen 17 (to 20) mm, tarsus 20 (to 22) mm. Female slightly smaller.

RANGE Moluccas Islands, New Guinea lowlands (up to 3,800 ft) and satellite islands (the Australian brown whistler *P. simplex* is closely related).

SUBSPECIES IN NEW GUINEA AREA Eight:

a) *waigeuensis* (Stresemann and Paludan); Waigeu, Gebe and Batanta Islands; wing 77–86 mm, culmen 17 mm; back olive; streaks on throat faint; no brown wash on breast; abdomen pale yellow.
b) *gagiensis* (Mayr); Gagi Island west of Waigeu; like *waigeuensis* but larger; wing 88 mm.
c) *griseiceps* (Gray); Aru Islands, Misol, Salawati and Vogelkop to head of Geelvink Bay; like *waigeuensis* but with a brownish wash on breast and browner ear-coverts.
d) *perneglecta* (Hartert); Weyland Mountains, Wanggar River, and south New Guinea east to Galley Reach, west of Port Moresby; like *griseiceps* but streaking on throat heavier.
e) *jobiensis* (Meyer); Japen Island and north New Guinea (Geelvink Bay to Astrolabe Bay [hybridizing with *dubia* eastward]); like *waigeuensis* but abdomen brighter yellow.
f) *miosnomensis* (Salvadori); Meos Num in Geelvink Bay; wing long, 90 mm.
g) *dubia* (Ramsay); south-eastern New Guinea west in south to Laloki River, in the north to Huon Peninsula; also D'Entrecasteaux Archipelago; differs from all the above in lacking yellow pigment: back brown; throat white moderately streaked; breast band distinct pale brown; abdomen white tinged brownish.
h) *sudestensis* (De Vis); Tagula (Sudest) Island, Louisiade Archipelago;

like *perneglecta* but larger and with longer bill; wing 88 mm, culmen 20 mm.

REMARKS This common species is usually found in the substage and lower trees of the forest, but it also ranges into the treetops and the undergrowth. Like many of its relatives, it perches in full view on a twig or branch and is a bird of slow, careful movements which looks for insects within its reach before moving to another perch.

***Pachycephala hyperythra* (Salvadori)**

Rufous-breasted Whistler. Length 6 in. Adults: top of head grey, side of head grey or brownish; back either brownish olive or brown, tail like back and wing quills edged with colour of back; throat white; breast, abdomen and under tail-coverts ochraceous to rufous; iris brown; bill black; feet pinkish grey. Male wing 90 mm, tail 60 mm, culmen 20 mm, tarsus 22 mm. Female slightly smaller.

RANGE New Guinea from near sea level to 4,400 ft.

SUBSPECIES Four:

a) *hyperythra* (Salvadori); Vogelkop, Onin Peninsula, Wandammen and Weyland Mountains; back olive-brown; white area in throat small; breast and abdomen dull ochraceous.
b) *sepikiana* (Stresemann); Idenburg to Sepik Rivers; like *hyperythra* but back more olive; white area on throat larger; breast and abdomen brighter ochraceous.
c) *reichenowi* (Rothschild and Hartert); Huon Peninsula; like *sepikiana* but back darker and browner and breast duller ochraceous.
d) *salvadorii* (Rothschild); south-eastern New Guinea; like *hyperythra* but underparts duller and paler; back browner.

REMARKS A fairly common bird in the forest undergrowth and lower substage, and very like *P. schlegelii* in habits

***Pachycephala phaionotum* (Bonaparte)**

Island Whistler. Length 6½ in. Adults: crown and side of head greyish brown, rest of upperparts brown; underparts whitish, heavily washed with greyish ochraceous on breast and flanks; iris brown; bill black; feet pink. Wing 93 mm, tail 70 mm, culmen 20 mm, tarsus 24 mm.

RANGE From Moluccas to Aru Islands, small western Papuan islands, and small islands in Geelvink Bay.

REMARKS This is a species found on small wooded islands, where it lives in the coastal vegetation of beach scrub or mangrove.

***Pachycephala modesta* (De Vis)**

Brown-backed Whistler. Length 5½ in. Adults: crown dark grey; ear-coverts brownish; rest of upperparts brown to dark brown or slaty; underparts grey, paler to whitish on throat and abdomen; iris brown; bill black; feet black. Wing 85 mm, tail 58 mm, culmen 16 mm, tarsus 22 mm.

RANGE Mountains of south-east New Guinea to those of Huon Peninsula, Central Highlands, and Sepik area; from 4,500 to 11,500 ft.

SUBSPECIES Three:

a) *modesta* (De Vis); south-east New Guinea and Herzog Mountains.
b) *hypoleuca* (Reichenow); Saruwaged and Sepik Mountains and Central Highlands; like *modesta* but somewhat darker, more greyish brown (less light olive-brown) on upperparts and darker grey below.
c) *telefolminensis* (Gilliard); Sepik and Telefomin Mountains; like *hypoleuca* but still darker above and below.

REMARKS This was one of the commonest species in the high mountain forests of south-eastern New Guinea, and at times its whistled songs made a pleasing medley. The birds glean slowly through twigs and leaves, usually in the treetops but sometimes lower, and occasionally they dart out to catch insects on the wing.

***Pachycephala monacha* (Gray)**

Black-headed Whistler. Length 6–6½ in. Adult male: head and neck black; rest of upperparts brownish black to black; side of head and neck, throat and breast black; rest of underparts white; iris brown; bill black; feet slaty; wing 87–93 mm, tail 65 mm, culmen 18 mm, tarsus 21 mm. Female: black of male replaced by grey; wing 89 mm.

RANGE Aru Islands and a number of scattered localities in central and eastern New Guinea, from sea level to 5,000 ft.

SUBSPECIES Two:

a) *monacha* (Gray); Aru Islands; male brownish black above.
b) *dorsalis* (Ogilvie-Grant); scattered localities: Utanata River, Balim River, Telefomin Valley, Ramu River, Wahgi and Baiyer Valleys, Snake River, and Astrolabe Mountains.

REMARKS This is a rather rare species which is closely related to *P. rufiventris* and perhaps conspecific with it. It was rather common, however, in casuarina groves in the Wahgi and Baiyer Valleys.

***Pachycephala rufiventris* (Latham)**

White-bellied Whistler. Length 5½–6 in. Adult male: top and sides of

head black which joins a black breast band; throat white; lower breast white or grey; abdomen white; back and rump grey; wing and tail quills fuscous edged grey; iris red-brown; bill black; feet slate; wing 80–90 mm, tail 64 mm, culmen 18 mm, tarsus 20 mm. Female: whole upperparts grey; throat white or whitish with fine, dark streaks; a grey breast band; rest of underparts white tinged buffy.

RANGE Moluccas, Australia, and two limited areas in the New Guinea region: in south-east New Guinea and on Rossel Island.

SUBSPECIES IN NEW GUINEA Two:

a) *leucogaster* (Salvadori and D'Albertis); south-east New Guinea from Hall Sound to Port Moresby, from sea level to 3,800 ft; grey areas pale.
b) *meeki* (Hartert); Rossel Island, Louisiade Archipelago; grey areas dark, forward edge of breast band may be blackish.

NESTING [A cup-shaped nest placed in fork of a tree; eggs two or three, olive colour, with dark brown markings around large end; size 22 × 17 mm. Australian data.]

REMARKS These white-bellied New Guinea races are quite different in appearance from the rufous-bellied Australian ones.

### *Pachycephala rufinucha* (Sclater)

Rufous-naped Whistler. Length 6½–7 in. Adults: forehead grey to white; top of head and hind neck grey with a large red-brown patch on nape; rest of upperparts olive; side of head grey; throat yellow; breast and abdomen white with sides olive; iris variable grey, yellowish or brown; bill black; feet brownish black. Wing 86 mm, tail 70 mm, culmen 20 mm, tarsus 30 mm.

RANGE Mountains of New Guinea, from 4,500 to 11,800 ft.

SUBSPECIES Five:

a) *rufinucha* (Sclater); Vogelkop; small red-brown neck patch, ash-grey forehead; upperparts olive with brownish tinge.
b) *niveifrons* (Hartert); Wandammen and Weyland Mountains to Central Highlands; like *rufinucha* but red-brown patch on hind neck larger; feathers on forehead white with dark centres; upperparts pure olive-green.
c) *gamblei* (Rothschild); south-east New Guinea; like *niveifrons* but white edgings of feathers of forehead smaller; olive of upperparts and flanks with a brownish tinge.
d) *prasinonota* (Mayr); Herzog Mountains; like *gamblei* but white edgings of feathers of forehead still smaller; olive upperparts and flanks less brownish tinged.

c) *lochmia* (Mayr); Huon Peninsula; like *niveifrons* but upperparts darker; flanks mixed with grey.

NESTING A deep cup of ferns, coarse rootlets and green moss is made and lined with thin fibres, etc. and placed in a fork of a bush seven feet up; eggs two, white with black and grey spots; young with grey, chestnut-tinged natal down above, buffy white down below.

REMARKS This whistler differs in habits from most of the other New Guinea species in being a shy, retiring bird found in the forest undergrowth, and only rarely venturing up into the lower trees. Its food is usually insects, but one specimen had its stomach full of fruit.

### *Pachycephala tenebrosa* (Rothschild)

Sooty Whistler. Length 7–7½ in. Adults: crown brownish black to black; rest of upperparts dark brown to brownish black; side of head blackish brown; underparts dusky brown, greyer on chin, slightly paler and more brownish on abdomen; iris brown to dark red; bill black; feet dark brown. Wing 93 mm, tail 80 mm, culmen 25 mm, tarsus 30 mm.

RANGE Weyland, Snow, Hindenburg and Sepik Mountains, from 4,800 to 7,000 ft.

SUBSPECIES Two:

a) *tenebrosa* (Rothschild) (details of range to be worked out). Weyland Mountains (southern part), southern Snow, Hindenburg and Sepik Mountains; back paler than brownish black crown.
b) *atra* (Rothschild); Weyland Mountains, in Gebroeders Mountains, and northern slopes of Snow Mountains; like *tenebrosa* but upperparts darker, back nearly as dark as black crown; underparts darker, less brownish tinged.

REMARKS This rare bird was found low in the shrubbery in the forest. Its food seems to be entirely insects.

### Myiolestes

The single member of this genus, which also occurs in Australia, is very like a large *Pachycephala*, with which it is keyed out.

### *Myiolestes megarhynchus* (Quoy and Gaimard)

Brown Shrike-flycatcher. Length 6½–7½ in. In most of New Guinea proper, this species has brownish olive upperparts with the crown only a little greyer or darker than back; underparts warm ochraceous, deeper or paler depending on the locality; the throat is sometimes paler or greyer, and the amount of streaking on throat and mottling on breast varies from slight to moderate. In north-western New Guinea the birds

are similar but lack most of the warm ochraceous tones, being greyer birds. In the islands off eastern New Guinea the birds are more variable (see group 2 under subspecies). Iris brown; bill horn-colour with mandible paler, or black in male (subspecies) or black in both sexes (subspecies); feet grey. Wing 95 (89–105) mm, tail 72 mm, culmen 23 (to 25) mm, tarsus 27 mm.

RANGE Sangi Island near Celebes; New Guinea and many of its satellite islands, lowlands and locally up to 7,000 ft; also in Australia.

SUBSPECIES IN NEW GUINEA AREA Twenty-two have been described. They fall into three groups.

GROUP 1 Upperparts brownish or greyish olive; underparts ochraceous with chin and throat slightly to somewhat paler or greyer to whitish, and with or without obscure streaking or mottling on throat and breast; bill horn-coloured except in subspecies *maeandrinus*.

a) *affinis* (Gray); Waigeu Island; though placed here the underparts are intermediate between those of the ochraceous type of the rest of this Group 1 and the grey underparts of the races of the following Group 2.
b) *batantae* (Meise); Batanta Island.
c) *misoliensis* (Meise); Misol Island.
d) *megarhynchus* (Quoy and Gaimard); Salawati, Vogelkop and Onin Peninsula.
e) *ferrugineus* (Hartert and Paludan); head of Geelvink Bay.
f) *aruensis* (Gray); Aru Islands.
g) *goodsoni* (Hartert); Merauke area of south New Guinea.
h) *wuroi* (Mayr and Rand); from Morehead to Oriomo Rivers of south New Guinea.
i) *palmeri* (Rand); Fly River basin.
j) *despectus* (Rothschild and Hartert); south coast of south-eastern New Guinea (Hall Sound to Milne Bay).
k) *superfluus* (Rothschild and Hartert); north coast of south-eastern New Guinea (Collingwood Bay to Aicora River).
l) *neos* (Mayr); Herzog Mountains area.
m) *madaraszi* (Rothschild and Hartert); Huon Peninsula.
n) *tappenbecki* (Reichenow); Astrolabe Bay to middle and lower Sepik area and Wahgi Highlands.
o) *maeandrinus* (Stresemann); upper Sepik area and Victor Emanuel Mountains to mid-altitudes just north of Mt Wilhelmina (Balim River); a brown form but with black bill in male as in the forms in Group 2.

GROUP 2 Upperparts greyish olive; underparts pale greyish to greyish brown, lacking the warm ochraceous of Group 1; bill black in male.

p) *idenburgi* (Rand); slopes above Idenburg River.
q) *hybridus* (Meise); north New Guinea from Humboldt Bay to Mamberamo River.
r) *obscurus* (Meyer); Japen Island.
s) *melanorhynchus* (Meyer); Biak Island, Geelvink Bay.

GROUP 3 Back olive to olive-green, crown darker and greyer; underparts whitish with breast and flanks greyish brown or grey; abdomen or under tail-coverts tinged yellow; or underparts more generally grey; in all cases streaking moderately distinct on throat at least; bill black in both sexes. Birds of this group look like a larger edition of *Pachycephala griseiceps*.

t) *fortis* (Gadow); D'Entrecasteaux Archipelago; throat whitish, breast grey, abdomen whitish tinged yellow.
u) *trobriandi* (Hartert); Trobriand Islands; like *fortis* but throat and breast deeper grey.
v) *discolor* (De Vis); Tagula (Sudest), Louisiade Archipelago; underparts whitish, breast and flanks pale greyish brown, under tail-coverts tinged yellow.

NESTING A cup-shaped nest is placed a few feet above the ground in a tangle of bamboo shoots, in saplings, or in the top of a pandanus tree, in rain forests. The nest is composed of many dead leaves and some slender twigs, rootlets, etc.; some were lined with leaves, others with fine fibres. Eggs, two, white or pink marked with brown and with grey spots and blotches, especially plentiful on larger end; size 18 × 24 mm. The young have scant dusky brown down on the upperparts.

REMARKS This is one of the common birds in the undergrowth and the lower parts of the second-storey trees of the forest. It is often seen alone or in pairs, searching with quick movements, on twigs and branches, for its insect food. These birds are usually shy and retiring, but respond readily to squeaking. Besides its loud whistled song of several notes, the species has a single, loud alarm note, and near its nest may give a soft, whining call.

### Colluricincla

This is an Australian-New Guinea genus. The single New Guinea species is a savannah bird, and this together with its size and grey colour are distinctive.

### *Colluricincla harmonica* (Latham)

Grey Shrike-flycatcher. Length 9 in. Adults: upperparts ashy grey, including tail and edgings of wing quills; lores white, extending as a pale line over eye; ear-coverts grey; throat whitish; breast and flanks

pale grey sometimes tinged buffy; throat and breast with an indication of obscure streaking; abdomen white; iris brown; bill black (male) or horn-brown (female); feet grey. Wing 125 mm, tail 102 mm, culmen 30 mm, tarsus 30 mm.

RANGE Australia and eastern New Guinea, west in north to Ramu River, in south to Merauke area; lowlands, locally up to 2,000 ft.

SUBSPECIES IN NEW GUINEA One, *tachycrypta* (Rothschild and Hartert).

NESTING One nest was found well-concealed in a fork of a pandanus about seven feet up in open savannah. The nest was cup-like, but irregular in shape to fit the space it occupied and was composed externally of fine, semi-woody stems, grass blades, and dead leaves, and lined with fine woody stems. Eggs two, white with dots, spots, and blotches of light and dark brown and greys, most common about larger end; size 28 × 20 mm.

REMARKS This was a common species in the savannahs of south New Guinea, and it presumably lives also in second growth and coastal brushland of some other areas.

### Pitohui

An endemic New Guinea genus.

### Key to *Pitohui* Species (Adults)

1 Plumage generally black or slaty grey: *P. nigrescens* (male).
Head black or grey, contrasting with red-brown back: 2.
Not so: 4.

2 Head, wings and tail black: 3.
Head grey: *P. kirhocephalus* (part).

3 Length over 10 in.; usually lowlands: *P. kirhocephalus* (part).
Length 9 in.; usually mid-mountain: *P. dichrous*.

4 Underparts dirty brownish white, breast and throat mottled brown: *P. incertus*.
Underparts brownish to fulvous or chestnut: 5.

5 With pronounced crest: *P. cristatus*.
Without crest: 6.

6 Bill pale brown: *P. kirhocephalus* (part) and *P. ferrugineus* (part, Waigeu).
Bill black: 7.

7 Length 10 in.: *P. ferrugineus* (part).
Length 8–9 in.: 8.

8 Throat brownish grey contrasting with fulvous to chestnut breast and abdomen: *P. kirhocephalus* (part).
Underparts brownish or greyish brown: *P. nigrescens* (female).

***Pitohui kirhocephalus* (Lesson and Garnot)**

Variable Pitohui. Length 8–10 in. Adults: this species shows a great deal of geographical variation, in size and colour: red-brown and fulvous or fulvous and grey-brown birds with black or brown wings and tail and black or grey or brown heads and throats. At one extreme the birds have the whole head, throat and breast, wings and tail and bill black; back and abdomen deep rich red-brown; at the other extreme the birds are nearly uniform red-brown or fulvous brown, paler below, wings and tail like back and with brown bill, or grey-brown above, fulvous below, with greyish head and throat and bill black. Intermediate plumage colours occur in various areas. Male wing 123 (95–125) mm, tail 110 mm, culmen 35 mm, tarsus 35 mm to wing 93 mm, tail 88 mm, culmen 27 mm, tarsus 29 mm. The female may be slightly smaller, and sometimes duller and plainer (see under subspecies), colour of soft parts variable, in part with geography; iris brown or blue; bill black or brown; feet grey.

RANGE New Guinea lowlands (up to 4,000 ft), western Papuan, Geelvink Bay, and Aru Islands; but absent from north New Guinea between Huon Gulf and Collingwood Bay.

SUBSPECIES Twenty, some of them of very different appearance:

a) *kirhocephalus* (Lesson and Garnot); north-eastern part of Vogelkop; sexes alike; head all round and throat grey; rest of underparts ferruginous; back dark red-brown; wings and tail fuscous.
b) *decipiens* (Salvadori); Onin Peninsula; like *kirhocephalus* but wings and tail blacker; male with head much darker, slaty; female with head only slightly darker.
c) *salvadorii* (Meise); Warbusi area of west coast of Geelvink Bay; population of hybrids between *kirhocephalus* and *dohertyi*.
d) *dohertyi* (Rothschild and Hartert); Wandammen district of western Geelvink Bay; like *decipiens* but wings and tail black, body plumage darker and richer; male head black, female blackish.
e) *stramineipectus* (van Oort); Triton Bay district; different from *rubiensis*?
f) *rubiensis* (Meyer); head of Geelvink Bay; like *decipiens* but male with head and tail somewhat paler; female somewhat paler than male.
g) *carolinae* (Junge, 1952); Etna Bay area; apparently very similar to *kirhocephalus* but head darker grey; upperparts darker brown, rump and tail darker, underparts paler.
h) *brunneivertex* (Rothschild); south-east coast of Geelvink Bay; quite different from the above in having the whole underparts bright ferruginous and sides and top of head the same or slightly paler; rest of upperparts including tail and outer edges of wing quills light rufous brown; bill horn-colour.

i) *jobiensis* (Meyer); Japen and Kurudu Islands, Geelvink Bay; like *brunneivertex* but much deeper and richer cinnamon-rufous.

j) *meyeri* (Rothschild and Hartert) (*proteus* is a synonym); north coast of New Guinea from Mamberamo River to Humboldt Bay area; variable population most like *brunneivertex* but paler more ferruginous brown above, slightly paler on head; paler ferruginous or fulvous below with throat darker and more grey-brown.

k) *senex* (Stresemann); upper and middle Sepik area; sexes alike; most like *kirhocephalus* but underparts much paler; wing 105 mm.

l) *brunneicaudus* (Meyer); north New Guinea from lower Sepik River to Astrolabe Bay and upper Ramu River; like *senex* but underparts slightly darker fulvous; like *kirhocephalus* but underparts paler and fulvous, not richer ferruginous; wing 105 mm.

m) *meridionalis* (Sharpe); south-eastern New Guinea west in north to Chads Bay (Awaiama Bay) and in south to Yule Island area; like *brunneicaudus* but larger and male with head and throat black; female like *brunneiceps*; male wing 122 mm.

n) *brunneiceps* (D'Albertis and Salvadori); south New Guinea, from Gulf of Papua to Fly River area; like *meridionalis* but male and female with head and throat brown, not black; wing 121 mm.

o) *nigripectus* (van Oort); south New Guinea between Mimika and upper Eilanden River; male back chestnut and abdomen ferruginous, rest of plumage black; female similar but breast ferruginous as well as abdomen; bill black; wing 125 mm.

p) *aruensis* (Sharpe); Aru Islands; like *nigripectus* but abdomen deeper, more chestnut, and breast chestnut mixed with black; female like *nigripectus* but head and throat dusky black, not black; wing 117 mm.

q) *uropygialis* (Gray); Misol and Salawati; upper back, lower breast and abdomen rich red-brown; rest of plumage black; wing 124 mm.

r) *tibialis* (Sharpe); western half of Vogelkop; like *uropygialis* but red-brown of upper and underparts deeper.

s) *cerviniventris* (Gray); Waigeu and Gemien Islands; upperparts pale greyish brown, darker and more brownish on wings and tail, paler and greyer on top and sides of head; throat greyish brown; breast, abdomen and under tail-coverts ferruginous; wing 95 mm.

t) *pallidus* (van Oort); Batanta Island and Sagewin Island, off Salawati; like *cerviniventris* but paler above and below; also larger wing, 100 mm.

REMARKS This species moves about in pairs or small parties, both high and low in the forest, searching for insects to eat and visiting fruiting trees to vary its diet. Though locally scarce, it is sometimes one of the common forest species.

***Pitohui dichrous* (Bonaparte)**

Black-headed Pitohui. Length 9 in. Adults: head all round, throat, wings and tail black; rest of plumage tan to rich red-brown; iris reddish brown; bill black; feet black. Wing 110 mm, tail 98 mm, culmen 31 mm, tarsus 33 mm.

RANGE From Arfak to south-eastern New Guinea in mid-mountain areas, from 1,200 to 5,000 ft (locally to sea level); also Japen Island.

SUBSPECIES Two have been recognized, *dichrous* (western) and *monticola* (eastern and southern), based on varying darkness of plumage, but as several geographically separated dark populations are known, giving a chequerboard distribution, the use of subspecific names is not helpful.

NESTING The nest is cup-shaped, made of curly tendrils of a vine and lined with finer tendrils, placed in a bush; eggs one or two, creamy or pinkish stone; size 30 × 21 mm.

REMARKS This is a forest bird, very similar to the *Pitohui kirhocephalus* subspecies with black heads, but it is a mid-mountain bird in most localities, and the geographical variation is not great and only seen in the intensity of the red-brown body plumage. Where the present species occurs in the same general part of New Guinea with black-headed *kirhocephalus*, the latter is larger.

***Pitohui incertus* (Van Oort)**

Mottle-breast Pitohui. Length 8½–9 in. Adults: upperparts dull earth-brown, brighter and more rufous on tail and edgings of wing quills; underparts pale, white tinged brownish, with throat and upper breast heavily mottled with dark brown; iris brown; bill horn-brown; feet olive-grey. Male wing 117 mm, tail 90 mm, culmen 25 mm, tarsus 33 mm. Female wing 109 mm.

RANGE South New Guinea from Noord to upper Fly River; in lowland forest.

REMARKS A rare species that has been found only a very few times.

***Pitohui ferrugineus* (Bonaparte)**

Rusty Pitohui. Length 10–11 in. Adults: upperparts earth-brown with rump and tail somewhat more rufous tinged; underparts much paler, fulvous to ochraceous; iris whitish to yellow to pale brown; bill brown to black or (subspecies) greyish white; feet grey. Wing 140 (130–54) mm, tail 110 mm, culmen 30 mm, tarsus 33 mm.

RANGE Aru Islands, some western Papuan and Geelvink Bay Islands and widespread in New Guinea lowlands, up to 2,000 ft.

SUBSPECIES Five, differing in intensity of colour of plumage, colour of bill and perhaps eye colour, but intergrading over wide areas in a rather confusing manner.

a) *leucorhynchus* (Gray); Waigeu and Batanta Islands; plumage dark, bill greyish white; wing 140 (to 154) mm.
b) *brevipennis* (Hartert); Aru Islands; like *leucorhynchus* but paler, bill black, and wing shorter, 130 mm.
c) *ferrugineus* (Bonaparte); Misol, Salawati Islands and Vogelkop, and Onin Peninsula, intergrading with *holerythrus* eastward; like *brevipennis* but larger and slightly paler; wing 140 mm.
d) *holerythrus* (Salvadori); Japen Island and variably paler populations intergrading with *ferrugineus* in central New Guinea; like *ferrugineus* but darker.
e) *clarus* (Meyer); eastern New Guinea; the palest race.

NESTING A deep cup nest was made in a multiple fork eight feet up in a slender substage tree in forest; nest of slender sticks and pieces of woody vines and plant fibre, lined with dead leaves of forest trees and with an innermost lining of fine stems and tendrils. A single, purplish pink egg with dark brown and grey spots which form a wreath around larger end.

REMARKS Often in pairs or small parties, this wood shrike moves about rather slowly through the substage and lower canopy of the forest, often giving soft little cries. Like some others of the genus, its food includes both insects and fruits.

### *Pitohui cristatus* (Salvadori)

Crested Pitohui. Length 9½–10 in. Adults: a long, full crest on top and back of head; upperparts dark olive-brown (tinged rufous in some populations) more rufous on hind neck; tail rufous; underparts ochraceous to fulvous, more rufous on breast; iris brown; bill black; feet grey. Wing 123 mm, tail 95 mm, culmen 30 mm, tarsus 37 mm.

RANGE Mountains of New Guinea, often only in mid-mountains, sometimes lowlands to 4,000 ft.

SUBSPECIES Three, not well defined and possibly specimens turn more rufous with museum age:

a) *cristatus* (Salvadori); Arfak and Onin Peninsula, and Weyland Mountains, intergrading eastward with *arthuri*.
b) *arthuri* (Hartert); Cyclops, Sepik and (variable population) Snow Mountains and south New Guinea; like *cristatus* but upperparts more olive, less rufous.
c) *kodonophonos* (Mayr); south-eastern New Guinea; like *cristatus* but paler below.

REMARKS Unlike its near relatives, the crested pitohui spends much time on the ground in the forest where it feeds on insects.

### *Pitohui nigrescens* (Schlegel)

Black Pitohui. Length 9 in. Adult male: black or greyish black. Female: upperparts olive-brown, crown sometimes washed with grey; tail washed rufous, and wing quills edged with rufous brown; underparts paler than back, fulvous brown, greyish brown or tinged rufous. Iris brown or grey-brown; bill black (partly horn-colour in some females); feet slate. Wing 127 mm, tail 100 mm, culmen 28 mm, tarsus 29 mm.

RANGE Mountains of New Guinea, from 3,500 to 7,000 ft.

SUBSPECIES Six, based on females chiefly:

a) *nigrescens* (Schlegel); Vogelkop; male, slaty black; female, underparts fulvous tinged grey, crown tinged grey.
b) *wandamensis* (Hartert); Wandammen Peninsula; like *nigrescens* but female deeper, more rufous brown; crown like back.
c) *burgersi* (Stresemann); Sepik Mountains and Central Highlands; separable from *meeki*?
d) *meeki* (Rothschild and Hartert); Weyland and Snow Mountains; like *nigrescens* but male deeper black; female with less grey tinge.
e) *schistaceus* (Reichenow); south-eastern New Guinea and Herzog Mountains; like *nigrescens* but male more slaty black; female more greyish tinged below.
f) *harterti* (Reichenow); Huon Peninsula; like *schistaceus* but female more brownish (less grey tinged) below.

NESTING The nest is cup-shaped, made of fern fronds and fine rootlets; a single, maroon-brown egg evenly blotched and spotted with brown and grey; size 32 × 23 mm.

REMARKS This, a mid-mountain bird, is a rather rare species. Its bill, strongly hooked, and with a subterminal 'tooth', is the most shrike-like in the genus, and the bird also has the most pronounced rictal bristles.

## Family Falcunculidae *Shrike-Tits*

*(One species in New Guinea)*

This Australia-New Guinea family is composed of only a few species. There is only the one genus, with one species, in New Guinea, and it seems an aberrant relative of the whistlers, *Pachycephala*.

### *Eulacestoma nigropectus* (De Vis)

Wattled Shrike-tit. Length 5–5½ in. Adults: the wedge-shaped bill is

diagnostic. Adult male: a large, fleshy wattle on each side of throat and lower side of head; upperparts olive-green, yellower on forehead and on sides of back and with a little semi-concealed black in middle of back; tail black, wings black, quills narrowly edged olive; chin yellow, throat and breast black, the feathers more or less fringed olive; flanks and abdomen dull olive; iris brown; bill greyish black; wattle red and pink; feet grey; wing 70 mm, tail 50 mm, culmen 15 mm (bill is 6 mm deep by 3 mm thick), tarsus 21 mm. Female: wattle absent; upperparts dull olive-green; wings fuscous edged with olive or rufous; tail fuscous washed with olive or rufous; underparts greyish olive with obscure whitish barring on breast, or underparts with throat dull yellow, abdomen whitish olive, flanks dull olive; wing 70 mm. Nestling: apparently has a rufous brown back and wing-coverts, and grey underparts with white abdomen.

RANGE Main mountain ranges of New Guinea from Weyland and Snow Mountains to Central Highlands, Herzog and south-eastern New Guinea mountain, from 6,500 to 9,000 ft.

SUBSPECIES Two very similar ones, *nigropectus* (De Vis), described from the extreme east; *clara* (Stresemann and Paludan), from the extreme west of the range. The meaning of the two types of female plumage needs to be elucidated.

REMARKS In south-east New Guinea this was a common bird, seen gleaning for its insect food through the undergrowth and low substage of the forest and favouring bamboo thickets. It moved about singly or in small parties of up to three or four birds, and in behaviour resembled the warbler, *Sericornis nouhuysi*. Elsewhere within its range, the species is reported as rare or uncommon.

## Family Laniidae *Shrikes*

*(Seventy-five species, one in New Guinea)*

Shrikes form a family of about seventy-five species, most of which live in Africa, but some in North America, Europe and Asia, and one species extends from the Himalayas to New Guinea, but does not reach Australia.

### *Lanius schach* (Linnaeus)

Schach Shrike. Length 10 in. Adult male: top and sides of head (to below eye) and neck black, changing to grey on foreback and to rufous on middle of back and rump; underparts white with flanks rufous; wings black, with inner secondaries edged with pale rufous and a semi-concealed white patch near base of flight feathers; tail, outer rectrices

with broad white basal areas and narrow white tips; iris brown; bill black; feet dark grey; wing 100 mm, tail 122 mm, culmen 23 mm, tarsus 30 mm. Female: similar, but sometimes with grey extending from upper back into hind neck. Immature: crown and hind neck grey-brown with irregular black bars; middle of back to rump rufous, barred black; underparts white to ochraceous with fine wavy barring on breast and flanks; side of head with conspicuous black patch from lores to around eye and ear-coverts.

RANGE New Guinea to Asia.

SUBSPECIES IN NEW GUINEA One, *stresemanni* (Mertens); in the eastern mid-mountain grasslands west to Huon Peninsula and Telefomin Highlands.

NESTING Nest a deep cup six feet up in tall reeds; eggs two (Shaw Meyer), [white blotched brown and lavender; size 22 × 17 mm. Philippine data].

REMARKS The schach shrike has some of the attributes of a songbird turned bird of prey. It sits alone on the top of some shrub or tall grass stem in a commanding position in the midst of mid-mountain grassland and watches for its prey. Most of this seems to be insects, often of large size, but one would expect it to take small lizards and small birds at times as do its relatives. The shrike usually swoops out and down to snatch its prey from grass or twig and then returns to its perch. This shrike is often noisy; it utters harsh cries, and mimics the voices of other birds, as well as singing a melodious song of its own. At one village in the Vanapa Valley of south-east New Guinea, a villager requested us not to shoot a shrike near his house because he liked to hear it sing, an attitude that surprised us in these near-Stone Age people, and it was not encountered again.

## Family Artamidae *Wood Swallows*

*(Ten species, three in New Guinea)*

Wood swallows form a family of some ten species found in the area from southern Asia to Australia and the Fiji Islands. They are gregarious birds which perch on exposed branches and fly out and catch insects on the wing. Some species spend a good deal of time sailing. Though somewhat swallow-like in flight, their habits bear more resemblance to flycatchers. The nest is cup-shaped, in a tree; the eggs two to four in number, whitish, marked with spots and blotches. The young bear some natal down on the upperparts. Both male and female share some at least of nest duties.

The greatest number of species occur in Australia, and there the birds gather at night into dense clusters for sleeping. The three New Guinea species are birds of open country, savannah or forest edge.

**Key to *Artamus* Species**

1 Rump and upper tail-coverts black: *A. cinereus.*
Rump and upper tail-coverts white: 2.
2 Larger, 8 in.; habitat mid-mountain: *A. maximus.*
Smaller, 7 in.; habitat lowlands: *A. leucorhynchus.*

***Artamus leucorhynchus* (Linnaeus)**

Lesser Wood Swallow. Length 7 in. Adults: upperparts greyish slate, more brownish on centre of back, and with lower rump and upper tail-coverts white; head and neck all round greyish slate except for lores which are black; rest of underparts white, more or less tinged grey; iris dark brown; bill light bluish grey; legs darker blue-grey. Wing 132 mm, tail 62 mm, culmen 23 mm, tarsus 17 mm.

RANGE Malay Archipelago to Australia and Fiji Islands.

SUBSPECIES IN NEW GUINEA Two:

a) *leucopygialis* (Gould); ranging from Moluccas over most of New Guinea lowlands (up to 1,600 ft) and islands and to northern and eastern Australia except for the range of (b).
b) subspecies; Sepik Valley; like *leucopygialis* but breast and abdomen greyer.

NESTING The nest is built in a fork ten feet up in a tree in savannah or on the edge of the forest. The nest is a rather firm cup of coarse grass blades and leaves lined with fine grass and semi-woody stems; eggs two, white, marked with dots, spots, and irregular blotches of earthy brown.

REMARKS Trees for perching and space around the trees for flying in pursuit of insects on the wing, are the requirements of the wood swallow, and thus it looks at habitat from quite a different point of view from earth-bound animals. We found this bird in the dry savannah, and also along forested stretches of the broad Fly River where it perched on dead branches leaning over the water and where, from the actions of a pair of birds, it also nests. In the town of Daru it was common in gardens with scattered shade trees.

This sociable bird was usually seen in parties which might number as many as twenty-five individuals. These flocks may spend long periods on some conspicuous perch, such as an exposed dead branch on the top of a dead tree where the birds line up close together. Occasionally a bird launches into flight and after flying and soaring about

for a few moments may return to perch. A call, 'chee-chee', is often given. When feeding, the birds fly and soar over and around the trees keeping in a loose open flock, calling frequently, and securing their insect prey on the wing. When the natives of the middle Fly River burned the grass of the savannah in a wallaby hunt these wood swallows moved in and were much more common.

***Artamus maximus* (Meyer)**

Greater Wood Swallow. Length 8 in. Adults: upperparts slaty black except for white lower rump and upper tail-coverts; head and neck all round like back; rest of underparts white; iris dark brown; bill bluish grey; feet dark grey. Wing 170 mm, tail 72 mm, culmen 30 mm, tarsus 22 mm.

RANGE New Guinea generally in mid-mountains, from 1,600 to 6,500 ft occasionally up to 8,500 ft, in open country or forest edge or over forested ridges.

NESTING A cup-shaped nest was built forty feet or higher up in the fork of a dead tree; young three in number; four or five different adults feed the young and once three adults were at the nest at one time. Both adults and young chatter noisily. (Loke Wan Tho.)

REMARKS This is a larger mountain edition of the lesser wood swallow which has similar habits, except that it soars much more. It is found in the mid-mountain grasslands and clearings. Often small parties of this species spend a good deal of time soaring on steady wings over the clearings and ridges. This is one of the smallest birds we know that really soars, and the development of this habit perhaps correlates with the updraft of air from the valleys. In addition to its 'chee-chee' call, a solitary, perched bird was heard to give a medley of loud, rather pleasing notes, probably a song.

***Artamus cinereus* (Vieillot)**

Black-faced Wood Swallow. Length 7 in. Adults: upperparts dark brownish grey, changing to black on rump and upper tail-coverts; tail black with white tips to lateral rectrices; underparts paler, more greyish than back; under tail-coverts white; lores, forepart of cheeks and chin black; iris brown; bill slate-blue with tip black; feet slate-grey. Wing 117 mm, tail 65 mm, culmen 20 mm, tarsus 22 mm.

RANGE Australia and Timor; one record from south New Guinea (Princess Marianne Straits).

SUBSPECIES IN NEW GUINEA One, *venustus* (Sharpe).

NESTING [Cup-shaped, on branch of a small tree; eggs three to four,

white with spots and blotches of various shades of brown; size 23 × 18 mm. Australian data.]

REMARKS In Australia this is a bird found in open or lightly timbered country and it is often seen in parties.

## Family Sturnidae *Starlings*

*(100 species, seven in New Guinea)*

This is a widespread family of the Old World with about 100 species, which include the talking myna (*Gracula*) of the Orient, which is often kept tame; and the Chinese myna (*Acridotheres*) and the common European starling (*Sturnus*), which have been widely introduced outside their normal range. Some starlings are tree birds, some walk freely on the ground in open country, and they all fly well. They eat insects and fruit. The birds are often noisy, some sing sweetly, and some mimic other birds and learn to talk. Many are gregarious, and some nest in colonies. At nesting time the birds pair, lay several white or blue, plain or spotted eggs, and both sexes share nest duties. The young hatch with some down.

The seven New Guinea species are all tree birds, which feed on the fruits of trees, and are often noisy. Some of them go about in large flocks while others are more often seen in pairs. Their known nests are either sited in a hole and are solitary, or else are pendant nests made in colonies. These New Guinea starlings fall into two quite different groups: the glossy starlings (*Aplonis*), with glossy black plumage (underparts streaked in immatures) and medium to long tails; and the mynas with short tails and black and yellow plumage. The mynas are easily distinguished by colour; the glossy starlings need to have field characters determined for them.

### Key to *Sturnidae* Species

1 Plumage glossy black: genus *Aplonis* (adult), 2.
Underparts streaked black and white: *Aplonis* (immatures).
Plumage black and yellow: genus *Mino*, 6.

2 Gloss moderate, greenish: 3.
Gloss high, green and purple: 5.

3 Tail considerably shorter than wing: *A. cantoroides.*
Tail as long as wing, to much longer: 4.

4 Western Papuan Islands only: *A. mysolensis.*
Biak and Numfor Islands, Geelvink Bay, only: *A. magna.*

5 With small, semi-erectile crest on forehead: *A. mystacea.*
Without crest on forehead: *A. metallica.*

6 Breast and upper tail-coverts yellow: *M. anais.*
Breast black, upper tail-coverts white: *M. dumonti.*

### *Aplonis cantoroides* (Gray)

Singing Starling. Length 7½–8½ in. Adults: plumage generally black with a moderate bluish-green gloss; outer tail feathers only slightly shorter than central ones; neck feathers lanceolate but not much elongated; iris red; bill and feet black. Male wing 103 mm, tail 70 mm, culmen 24 mm, tarsus 23 mm. Female wing 100 mm. Immature: upperparts greyish black; underparts streaked black and white.

RANGE Solomon Islands to New Guinea and its islands (to western Papuan Islands, Aru Islands, some eastern Papuan Islands); usually in the lowlands, and at 5,200 ft.

NESTING The nests are solitary, made in a hole in a tree or a hollow palm stub. The nest is sometimes easily found because of the grassy nest material projecting from the cavity. A single pale blue egg with bright brown and violet spots; size 26 × 20 mm.

REMARKS This species illustrates the variation of a bird's habits from time to time and from place to place. The square-tailed starling seems to be a lowland bird in general, going about singly or in pairs, in the trees of the forest or forest edge, and to be somewhat uncommon. In the Central Highlands, however, near the Wahgi River at 5,200 ft, the species was very common and seen in flocks. In April and May the birds were not breeding and the flocks numbered thousands which roosted in the canopy of a large patch of forest surrounded by grassland. Later in the year when the breeding season was approaching the flocks were of fifteen to twenty birds, and when they perched in trees the flocks broke up into pairs and the males started courtship activities which included melodious whistling calls.

### *Aplonis mysolensis* (Gray)

Moluccan Starling. Length 8 in. Adults: black, lightly or moderately glossed with steel-green; neck feathers lanceolate but not greatly lengthened; tail strongly graduated. Male wing 112 mm, tail 123 mm, culmen 24 mm, tarsus 25 mm. Female wing 107 mm, tail 101 mm.

RANGE From the Moluccas eastward to the western Papuan Islands (Misol, Gebe, Waigeu, Salawati and Batanta and small islands off the Sorong district of Vogelkop).

SUBSPECIES IN NEW GUINEA One, *A. m. mysolensis* (Gray).

REMARKS This seems to be another species, like certain white-eyes and pigeons, which lives only on small islands. Ripley found it common in

the Schildpad Islands where it flew noisily in twos or threes, and perched in low bushes. It was very fond of papaya seeds.

### *Aplonis magna* (Schlegel)

Long-tailed Starling. Length 11–16 in., including very long tail. Adults: black with a moderate greenish gloss; neck feathers lanceolate but little lengthened; tail as long as or longer than rest of body, much graduated, and outer tail feathers may be as much as 5 in. shorter than the central pair; iris brown; bill and feet black. Measurements given under subspecies.

RANGE Islands in Geelvink Bay (Biak and Numfor Island).

SUBSPECIES Two:

a) *magna* (Schlegel); Biak Island; tail longer; male wing 128 mm, tail 215 mm, culmen 29 mm, tarsus 31 mm; female wing 116 mm, tail 190 mm.
b) *brevicauda* (van Oort); Numfor Island; tail shorter; male wing 122 mm, tail 160 mm; female wing 114 mm, tail 140 mm.

REMARKS This is a common species on Biak Island where Ripley found a pair, not in breeding condition, to be very concerned with a hole in the thatch of a native house. Individuals were seen mostly near human habitations, but also in original forest up to 2,200 ft. The song consists of a series of loud, rather incomplete warbles.

This island species is a geographical representative of *A. mysolensis* and differs from it chiefly in the larger size and especially in the longer tail.

### *Aplonis mystacea* (Ogilvie Grant)

Grant's Starling. Length 8 in. Adults: generally black with a high gloss, black on head and neck, brilliant green on body, with a small amount of purple on foreneck and forebreast; on forehead a small semi-erectile crest of thin feathers ½ in. long; feathers of neck narrow, lanceolate and lengthened; tail strongly graduated, with outer feathers an inch or more shorter than central ones which are pointed; eye yellow; bill black; feet brownish black. Male wing 104 mm, tail 82 mm, culmen 22 mm, tarsus 19 mm. Female wing 98 mm. Immature: underparts white streaked black.

RANGE Southern New Guinea from Mimika River to upper Fly River, also head of Geelvink Bay.

REMARKS This bird is possibly common within its range, but its close similarity to the metallic starling has hindered field identification, and Grant's starling has been recorded only a few times. On the upper Fly River where an Archbold expedition found both species, the differences

were not recognized until the birds were in the hand. However, both seemed to have similar habits; flying over the forest in bands of 30 to 100 birds, uttering chattering calls, and perching high in trees. Both species were reported by the discoverer of *mystacea* to fly in the same flocks.

### *Aplonis metallica* (Temminck)

Metallic Starling. Length 8½–9½ in. Adults: black with a very high gloss, mostly green but conspicuously purple on crown, nape, foreback and forebreast; feathers of neck lanceolate, narrow, and lengthened; tail strongly graduated, outer tail feathers 1½ in. shorter than central ones which are pointed; iris orange-red; bill black; feet black. Wing 107–10 mm, tail 100–15 mm, culmen 24 mm, tarsus 24 mm. Immatures: underparts white streaked black.

RANGE Moluccas Islands to northern Australia, New Guinea and Solomon Islands; lowlands to 7,500 ft.

SUBSPECIES IN NEW GUINEA Two:

a) *metallica* (Temminck); Moluccas Islands, all New Guinea (mostly in lowlands, rarely to mid-mountains) and adjacent islands (except those in Geelvink Bay) and north-eastern Australia.
b) *inornata* (Salvadori); Geelvink Bay islands of Biak and Numfor; like *metallica* but much duller iridescence, and slightly smaller.

NESTING Nests are grouped in colonies which may contain scores and are often situated high in isolated trees. The nest is oval, with the entrance on the side, and it is suspended from a small branch; [eggs two to four, pale bluish white spotted and speckled with brown and grey; size 28·5 × 20·5 mm. Australian data].

REMARKS The metallic starling is one of the common birds in the New Guinea lowland forests, especially where these are swampy and broken. It is also found along the forest edge. The species is a noisily chattering, gregarious bird both in and out of the nesting season. The flocks may contain hundreds of individuals, and they sometimes perch high on conspicuous branches above the general level of the forest. The birds usually feed on the fruits of trees which range from the pandanus to the fig-tree. However, once we saw these starlings coming into a Daru garden to feed on small, ripe red peppers, and at another time a flock was seen feeding on the large, winged green ants which are attractive to so many New Guinea birds. The starlings were perched in the top of a tall tree by a river and every now and then an individual would fly up, catch an ant, and return to its perch. Rollers were also feeding on this ant swarm, circling and snapping up the insects, and two species of swifts swept back and forth through the swarm.

***Mino anais* (Lesson)**

Golden-breasted Myna. Length 9½ in. Adults: black and orange with white in wings; head black all round or with top of head orange-yellow with or without black area of variable size on nape (depending on the subspecies); breast, side of neck, hind neck, rump and upper tail-coverts orange-yellow; abdomen and under tail-coverts paler orange-yellow; rest of plumage black more or less glossed with green and remiges each with a conspicuous white spot in its terminal half; skin about eye naked and dark; iris, bill and feet yellow. Male wing 150 mm, tail 71 mm, culmen 26 mm, tarsus 33 mm. Female wing 147 mm. Young birds: duller, always with black on top of head, and underparts black fringed yellow. (The genus *Melanopyrrhus* is not recognized.)

RANGE New Guinea lowlands and islands of Salawati and Japen.

SUBSPECIES Three:

a) *anais* (Lesson); Salawati and west coast of Vogelkop; top of head black.
b) *orientalis* (Schlegel); Japen Island and north New Guinea (Wandammen area of Geelvink Bay and Onin Peninsula east to Astrolabe Bay); crown yellow, nape black.
c) *robertsoni* (D'Albertis); southern New Guinea (Mimika River east to Milne Bay); crown and nape yellow, though a few black feathers present on nape.

NESTING This probably takes place in natural cavities high in trunks of forest trees, judging by actions of a pair of birds in the breeding season.

REMARKS Small parties of these stout-bodied, orange and black birds often perch in exposed treetops to rest and they feed on the fruit of tall forest trees. This is a common, noisy bird and in addition to hoarse calls and whining, whistled cries, it has a short, sweetly whistled song.

***Mino dumonti* (Lesson)**

Yellow-faced Myna. Length 10 in. Adults: black, glossed with green and purple, except for large orange area of skin around eye, white upper and under tail-coverts, yellow abdomen, and large white spots in wing quills forming a band across remiges; iris brown or orange; bill orange; feet yellow. Male wing 156 mm, tail 74 mm, culmen 33 mm, tarsus 40 mm. Female wing 152 mm. Immatures: similar but duller, abdomen paler.

RANGE New Guinea to Solomon Islands.

SUBSPECIES IN NEW GUINEA One, *dumonti* (Lesson); western Papuan Islands (Salawati, Batanta and Waigeu), Japen Island, Aru Islands, and all New Guinea lowlands; (*violaceus* is not recognized).

NESTING This probably takes place in a hole in a tree.

REMARKS Like the golden-breasted myna this species often sits for long periods on high perches in a thickly leaved tree rising above the general level of the forest or on a tall dead branch. Though sometimes in small parties, this bird is more commonly seen in pairs, and their calls, especially a two- or three-note squeak or squawk, and hoarse cries, are conspicuous elements in the bird voices of the forest. Numbers of these birds gather to feed noisily on the fruits of tall forest trees where golden-breasted grackles and pigeons may feed at the same time.

## Family Oriolidae *Orioles*

*(Twenty-six species, four in New Guinea)*
Only four of the twenty-six species of orioles live in New Guinea to which, however, only one species is restricted. These are all tree birds which feed largely on fruit. Other species live in Africa, Europe, Asia and the intermediate Indies to Australia.

In general orioles have melodious songs and harsh calls. They pair at nesting time, build a nest in a tree, and both sexes share some at least of the nest duties. The young have some natal down.

### Key to *Oriolidae* Species

1 Naked orange or red area about eye: *S. vieilloti.*
Side of head fully feathered: 2.
2 Underparts yellowish green, fine streaks obscure: *O. flavocinctus.*
Underparts pale greyish brown, streaks fine: *O. szalayi.*
Underparts white, streaks broad: *O. sagittatus.*

### *Oriolus szalayi* (Madarász)

Brown Oriole. Length 10–11 in. Adults: crown and hind neck brownish grey heavily streaked fuscous; rest of upperparts greyish brown streaked fuscous on foreback and streaks decreasing posteriorly; outer tail feathers narrowly tipped white; eye stripe indistinctly grey streaked black; side of head and side of neck black, more or less streaked white; throat white with fine black streaks; rest of underparts pale greyish brown with fine fuscous streaks; iris red; bill dark red; feet fuscous. Wing 148 mm, tail 110 mm, culmen 36 mm, tarsus 26 mm.

RANGE Western Papuan Islands and all New Guinea lowlands (rarely up to 4,800 ft).

NESTING A rough, firm cup nest is suspended by its edges from a fork of a lateral branch of a tree, twenty-five to thirty feet up. The nest is of bark fibres, lined with fine grass and semi-woody stems; eggs two, pale

brownish white with spots and dots of chocolate brown and greys, most plentiful about larger end; size 32 × 23 mm.

REMARKS The brown oriole seems to be most common on the forest edge, whether this be by clearings, savannah, marsh or river; and also in second growth and denser savannahs. Claude Grant records the species as scarce inland but not uncommon in pairs in the mangrove swamps of the coast. On the Fly River this oriole was usually found singly, well up in the trees on the fruit of which it fed. However, on the Sepik the birds were in small flocks at certain seasons. In September, when the birds were breeding, their song consisted of several full, rich notes.

***Oriolus flavocinctus* (King)**

Green Oriole. Length 10 in. Adults: upperparts yellowish green, crown and hind neck with fine black streaks and the mantle with somewhat coarser ones; upper lesser wing-coverts like back, median and greater wing-coverts, primary coverts and secondaries black, edged with green and conspicuously tipped with pale yellow; primaries black, narrowly edged and tipped with whitish; lateral tail feathers black, edged with green and with large pale yellow terminal spots; lores grey; sides of head, throat and breast yellowish green with obscure fine black streaks; rest of underparts paler and more yellowish with a few fine streaks; iris dark red; bill dark brownish red; feet grey. Male wing 140 mm, tail 105 mm, culmen 35 mm, tarsus 25 mm. Female wing 130 mm.

RANGE Northern Australia and southern New Guinea.

SUBSPECIES IN NEW GUINEA One, *mulleri* (Bonaparte); Aru Islands and lowland southern New Guinea (Wassi Kussa River to Princess Marianne Strait).

NESTING [A cup-shaped structure of strips of bark, etc., well woven together and suspended near end of a long branch of a tree fifteen to fifty feet up; eggs two, pale cream colour spotted and blotched with brown and grey; size 33 × 22 mm. Australian data.]

REMARKS In Australia this species is said to be a common bird in both forest and mangrove swamp.

***Oriolus sagittatus* (Latham)**

White-bellied Oriole. Length 10–11 in. Adults: upperparts greyish olive-green with obscure fine dark shaft streaks to the feathers; median and greater wing-coverts, primary coverts and secondaries broadly edged grey and narrowly tipped white; remiges black, edged grey; central tail feathers greenish grey, lateral ones edged grey and with a large white terminal spot on inner web; throat grey, more or less streaked

with dusky and washed olive; rest of underparts whitish broadly streaked fuscous and washed with yellowish on the sides; iris brown; bill reddish brown; feet slaty blue. Wing 145 mm, tail 101 mm, culmen 35 mm, tarsus 26 mm. With wear the crown and mantle become greyer and the underparts whiter. Young birds: greyer above, with streaking more pronounced.

RANGE Australia and southern New Guinea.

SUBSPECIES IN NEW GUINEA One, *magnirostris* (van Oort); lowlands of south New Guinea from Oriomo River to Merauke district.

NESTING [Nest a cup-shaped structure of strips of bark, etc., suspended by its rim from a fork of a branch of a tree, often at some height. Eggs two to four, pale cream colour with spots and blotches of umber brown and grey; size 33 × 23 mm. Australian data.]

REMARKS Though the fruit of trees may be the main diet of this species, in south New Guinea where it was rather common in the open savannahs, individuals were sometimes seen to fly up above the trees to catch insects on the wing, and several specimens had only insects in their stomachs.

***Sphecotheres vieilloti* (Vigors and Horsfield)**

Fig Bird. Length 10½ in. Adult male: naked area about eye and to bill orange-yellow or purple-red; crown and ear-coverts glossy black; hind neck grey; back and wing-coverts olive-green; secondaries black, broadly edged with olive-green; primaries black narrowly edged grey; tail black, other quills broadly tipped white and outermost ones also edged white; chin, throat and sides of neck grey; breast and flanks olive-green, more or less washed grey; abdomen yellow; bill black; feet flesh-coloured; wing 145 mm, tail 110 mm, bill 27 mm, tarsus 25 mm. Female: upperparts dusky olive obscurely mottled with fuscous and washed posteriorly with olive; throat brownish and rest of underparts white, streaked with fuscous; tail dusky olive; naked area about eye small and purplish red.

RANGE Eastern Australia and south-eastern New Guinea.

SUBSPECIES One, *salvadorii* (Sharpe); south-eastern New Guinea lowland savannah from Port Moresby to Rigo.

NESTING [Unlike other orioles, a shallow flimsy cup high in fork of a branch; eggs three, pale greenish and spotted; size 33 × 24 mm. Australian data.]

REMARKS A flock of ten birds found at dusk in an isolated, leafy tree in the savannah seems to be the only New Guinea observation. In

Australia this is said to be an active, noisy bird frequenting fruiting trees.

## Family Grallinidae *Mudnest Builders or Magpielarks*

*(Four species, one in New Guinea)*
This is a family restricted to the Australian area with only four species, three in Australia, and one in New Guinea. Though there is some doubt about the classification of the three Australian species, there is no doubt that the New Guinea torrentlark is closely related to the Australian magpielark.

### *Pomareopsis bruijni* (Salvadori)

Torrentlark. Length 7¾ in. Adult male: generally black with conspicuous white patches as follows: line over and behind eye, all upper wing-coverts, basal two-thirds of rectrices, lower abdomen and under tail-coverts; iris dark brown; bill lavender; feet lavender; wing 106 mm, tail 80 mm, culmen 24 mm, tarsus 30 mm. Female: upperparts like those of male, but more conspicuous white line over eye which extends from forehead to region of ear-coverts and buffy tinge to white of rump and upper tail-coverts; underparts very different from male's, chin and throat being black, breast to under tail-coverts white tinged buffy posteriorly; wing 106 mm. The nestling resembles the adult female in colour but the back is duller.

RANGE Mountains from 1,500 to 6,500 ft; along streams only.

NESTING One nest brought in by a native was a cup-shaped structure of mud and rootlets; a single egg.

REMARKS A medium-sized black and white bird seen on the rocks of a swift-flowing small mountain stream, either in grassland or in forest, is sure to be the torrentlark. The name indicates its habitat and also its relationship to the magpielark of Australia. This bird is in part the ecological counterpart of the fork-tails of southern Asia and the dippers of the north temperate zone. Singly or in pairs, it moves about over the rocks, both wet and dry, and along the water's edge, with great agility. We have never seen it go into the water. Sometimes when it alights on a rock, or on a low branch over a stream, the wings may be spread as if in some sort of a display, or the tail may be fanned or wagged as though it were not solidly attached. A low buzzing call is sometimes given as the bird flies. Its recorded food is insects.

## Family Cracticidae *Butcherbirds* and *Bell Magpies*

*(Ten species, five in New Guinea)*

This is an Australian-Papuan family of some ten species. Two of the three genera, including five species, are represented in New Guinea, and illustrate two somewhat different types. The four butcherbirds are tree birds which take their food of insects and occasionally lizards from the branches, and also eat fruit. The single magpie feeds on the ground but perches freely in trees. All the birds have loud calls. The nests are bulky, basin-shaped structures built in trees, and are made of twigs lined with finer material.

In Australia the butcherbirds are recorded as impaling their prey on thorns or wedging it in crevices before tearing it to pieces with their hooked bills.

### Key to Species

1 Plumage all black: *Cracticus quoyi.*
Plumage black and white: 2.

2 Chin black, throat to under tail-coverts white: *C. mentalis.*
Chin to upper breast black, lower breast to under tail-coverts white: *C. cassicus.*
Underparts black except for white posterior abdomen and under tail-coverts: 3.

3 Length 16 in., hind neck white: *Gymnorhina tibicen.*
Length 11–12 in., hind neck black: *C. louisiadensis.*

### *Cracticus cassicus* (Boddaert)

Black-headed Butcherbird. Length 12½ in. Adults: head and neck all round and upper breast black; back mottled black and white though the black feathers having broad white tips or edgings in varying amounts; lower rump and upper tail-coverts white; wing black with a variable amount of white on upper greater wing-coverts and inner secondaries to give a conspicuous white pattern; tail black; outer rectrices broadly tipped white; lower breast, abdomen and under tail-coverts white; iris dark brown; bill pale bluish grey with tip black; legs black. Male wing 170–85 mm, female wing 167–77 mm; size varies with subspecies.

RANGE New Guinea and satellite islands.

SUBSPECIES Two:

a) *cassicus* (Boddaert); Aru Islands, western Papuan Islands, islands of Geelvink Bay, and all New Guinea lowlands up to 2,000 ft; male wing 170 mm, tail 127 mm, culmen 52 mm, tarsus 35 mm.

b) *hercules* (Mayr); Trobriand Islands and D'Entrecasteaux Archipelago; like *cassicus* but much larger; male wing 185 mm, tail 39 mm, culmen 60 mm.

NESTING A basin-shaped nest made of coarse twigs and sticks, forty feet up in tree; eggs two to three, pale olive, tinged blue or green with faint spots of brown and blackish brown, more numerous on larger end; size 33 × 25 mm.

REMARKS The black-headed butcherbird is a common bird in the lowland forest and dense second growth. Its calls are often heard and the loud, melodious song, often accompanied by fluttering wings, is one of the common bird voices. These birds move slowly about through the tops of the trees in small parties, looking for insect prey among the branches. Fruit of various sorts is also frequently eaten.

***Cracticus louisiadensis* (Tristram)**

Louisiade Butcherbird. Length 11–12 in. Adults: plumage generally black except for broad white edges to a few feathers on each side of upper back, two inner secondaries, and longer upper tail-coverts; also a white spot on each side of breast; lower abdomen, under tail-coverts, under wing-coverts and tips of outer tail feathers white; iris dark brown; bill grey-blue with black tip; feet black. Male wing 170 mm, tail 125 mm, culmen 50 mm, tarsus 36 mm. Female wing 160 mm.

RANGE Tagula Island, Louisiade Archipelago.

REMARKS This species looks like a blacker representative of the black-headed butcherbird.

***Cracticus mentalis* (Salvadori and D'Albertis)**

White-throated Butcherbird. Length 11 in. Adults: forehead to nape and sides of head black; a narrow white band across hind neck; back black with lateral feathers of foreback more or less white; rump grey; upper tail-coverts white; wing black with much white in greater upper wing-coverts and two inner secondaries; rectrices black with much white in basal and terminal thirds; chin black, rest of underparts white; iris brown; bill bluish grey with tip black; feet black. Male wing 150 mm, tail 110 mm, culmen 41 mm, tarsus 32 mm. Female wing 145 mm.

RANGE Southern New Guinea and Cape York peninsula of Australia.

SUBSPECIES IN NEW GUINEA One, *mentalis* (Salvadori and D'Albertis); southern New Guinea from Merauke to Port Moresby; lowland savannah up to 2,200 ft.

NESTING A shallow basin-shaped nest of sticks, woody and semi-woody

stems of a creeper, and rootlets, and lined with finer rootlets; placed seventy-five feet up in a multiple fork in a tree where savannah fringed a lake; eggs three, pale greyish brown with dark earthy brown spots and blotches forming a dense wreath around the larger end and scattered sparingly over rest of shell; size 29 × 22 mm; the newly hatched young have some down present on upperparts. The female incubated with the male in attendance.

REMARKS The taller, denser savannah was the favourite habitat of the white-throated butcherbird, but it both came out into the more open savannah and ventured into the edge of the forest. The bird usually hunted for its prey of insects and small lizards by moving slowly through the branches of the trees, but it sometimes descended into shrubbery near the ground. The loud song of several notes is sometimes accompanied by a raising and lowering of the wing tips.

***Cracticus quoyi* (Lesson)**

Black Butcherbird. Length 13–14 in. Adults: plumage black with a moderate gloss; iris dark brown; bill bluish grey with tip black; feet black; wing 180 mm, tail 130 mm, culmen 59 mm, tarsus 42 mm.

RANGE New Guinea, some satellite islands, and northern Australia.

SUBSPECIES IN NEW GUINEA Two:

a) *quoyi* (Lesson); Misol, Salawati, Waigeu, and Japen Islands and all New Guinea lowlands up to 3,200 ft (rarely to 4,300 ft).
b) *spaldingi* (Ramsay); northern Australia and Aru Islands; like *quoyi* but bill more slender.

NESTING A bulky, basin-shaped nest is placed high in a forest tree. [Eggs four, greyish green with roundish spots of brown and grey especially plentiful about larger end; size 34 × 25 mm. Australian data.]

REMARKS This seems to be a scarce, shy forest bird. As one might expect from the size of its hooked bill, this species takes large insects and lizards. However, it also eats fruit. In Australia, it is recorded as living in the mangroves and eating crabs.

***Gymnorhina tibicen* (Latham)**

Black-backed Magpie. Length 16 in. Adults: black except for white on the following areas: nape and hind neck, rump, upper tail-coverts and basal two-thirds of tail, greater wing-coverts, and in bases of primaries, and under wing-coverts. Wing 245 mm, tail 140 mm, culmen 62 mm, tarsus 58 mm.

RANGE South New Guinea (Princess Marianne Straits to Oriomo River) and Australia.

SUBSPECIES IN NEW GUINEA One, *papuana* (Bangs and Peters).

NESTING [Nest a bowl-shaped structure of sticks, twigs, and lined with soft material in fork of tree, usually high; eggs three to five, colour variable, grey to brownish or greenish blue, heavily marked with brown; size 44 × 29 mm. Australian data.]

REMARKS The magpie was fairly common in the more open savannah behind the Oriomo and the Wassi Kussa Rivers. The birds' loud whistled calls carried far across the savannah, attracting attention. Often the birds fed on insects on the ground, in parties of three or four. They were very wary, however, and while an intruder was still distant, the magpies would fly to perch in treetops beyond, where they were equally wary.

## Family Dicruridae *Drongos*

*(Twenty species, two in New Guinea)*
Africa, southern Asia, and the Indo-Australian area is the range of this family with two species in New Guinea, one reaching Australia. It is a small family of but twenty or so species. All but one of the drongos belong to a single genus, *Dicrurus*. The Papuan mountain drongo is the sole representative of the other genus which is characterized by a heavier, more hooked bill, longer rictal bristles, and an extra pair of tail feathers, having twelve rather than the usual ten.

### Key to *Dicruridae* Species

Length 8 in., no conspicuous fork in end of tail: *C. papuensis.*
Length 10–11 in., tail conspicuously forked: *D. hottentottus.*

### *Chaetorhynchus papuensis* (Meyer)

Mountain Drongo. Length 8 in. Adults: black; head and body glossed blue with a short crest; some concealed white at base of scapulars; tail nearly square; iris dark brown; bill black; feet black. Wing 126 mm, tail 95 mm, culmen 24 mm, tarsus 22 mm.

RANGE Mountain forests of New Guinea, from 2,000 to 4,800 ft.

REMARKS It is easy to mistake this uncommon bird for some unknown big black flycatcher of the monarch type, as it sits upright on a branch in the lower part of the forest.

***Dicrurus hottentottus* (Linnaeus)**

Spangled Drongo. Length 10–11 in. Adults: plumage black with iridescent wings and tail, and iridescent tips to feathers of crown and breast, giving the effect of spangles; a few under wing-coverts tipped with white; fork of tail ½ in. or more deep with outer lengthened rectrices curved outward giving a distinctive appearance; iris red; bill black; feet black. Male wing 150 mm, tail 145 mm, culmen 34 mm, tarsus 24 mm. Female wing 145 mm (larger and smaller sized birds are found in various parts of New Guinea). Immatures: all dull smoky black.

RANGE Southern Asia through the Malay Archipelago to New Guinea, Australia and Solomon Islands; lowland forests up to 2,400 ft.

SUBSPECIES IN NEW GUINEA Three, one a migrant:

a) *carbonarius* (Bonaparte) (*ultramontanus, propinquus* and *dejectus* are not recognized); New Guinea and satellite islands; gloss of plumage strongly blue-purple.
b) *bracteatus* (Gould); Australia, migrating to south New Guinea (Fly River area); gloss of plumage strongly green, and on average larger than *carbonarius*.
c) *atrocaeruleus* (Gray); Moluccas to the west Papuan island of Kofiau; like *carbonarius* but larger, wing 168–81 mm.

NESTING The nest is a shallow basket made of twigs and tendrils, lined with finer material and bound together with cobwebs; hung by its edges in the fork of a tree, often thirty to sixty feet up. [Eggs three to four, pinkish white with markings of brown and purple; size 29 × 21 mm. Australian data.]

REMARKS This is a common, conspicuous bird in the middle spaces and treetops of the forest; the resident spangled drongo sits up straight on the branches, tail pointing down and often twitching. The birds are often seen in little parties of their own kind, or with some other birds such as *Pitohui*. This drongo is often noisy, giving a variety of calls, some harsh, some pleasing. Their swift flight may take them some little distance through the forest, from one perch to another, and sometimes the birds indulge in short chases. Some, perhaps most, of their food is insects, caught in the air by swift flight or taken from leaf or twig.

The above information is probably also true of the green-glossed migrants from Australia, but the only positive information refers to their migrating behaviour. They breed in Queensland from October to January, arriving in some sections in October and leaving by late February. In New Guinea they have been recorded in some numbers in the Fly River area in March, April, June and November. On the lower Fly River in November they were commonly seen in pairs or

small parties flying 90 to 180 ft up over the savannah and forest. They were moving south-east, parallel to the river, as though working down to the point of land between the Fly and the Bamu Rivers before crossing to Australia.

A single female in breeding condition was taken at nearby Bugi on 3 January, and it may not have been simply a left over migrant, but suggests that a few birds may breed in south New Guinea. If this is the case, it will be necessary to consider the Australian bird a different species.

## Family Corvidae Crows

*(100 species, three in New Guinea)*

Crows and their smaller relatives, the jays, etc., form the family Corvidae of some 100 species with some found in every continent. However, most species live north of the equator. Only a few jays live in South America, a few crows live in Africa, and a few crows live in Australia. In New Guinea there are three species of crows, all lowland birds; two of them are peculiar forest species and one, a black crow, is of a widespread type which lives along the coast and in open country.

The intelligence shown by many of the members of this family has led to the view that this is perhaps the most advanced song bird family.

### Key to *Corvidae* Species

1 An area of bare skin about eye, plumage whitish to dark, tail relatively long: *G. tristis.*
No area of bare skin on face, plumage black or dark, tail moderate: 2.

2 Plumage all glossy black, bill stout: *C. orru.*
Plumage black with dark brown head, bill very high with arched culmen: *C. fuscicapillus.*

### *Corvus orru* (Bonaparte)

Papuan Crow. Length 18 in. Adults: generally glossy black but with concealed white bases to many feathers of head and body; iris with an inner ring of blue and an outer one of white (immature, brown); bill black; feet black. Male wing 320 mm, tail 170 mm, culmen 65 mm, tarsus 66 mm. Female wing 305 mm.

RANGE Moluccas to New Guinea and most satellite islands; lowlands up to 1,600 ft.

SUBSPECIES Two:

a) *orru* (Bonaparte); range of the species except that of *salvadorii*; gloss purplish.

b) *salvadorii* (Finsch); southern and south-eastern New Guinea (Port Moresby and Rigo to Merauke); gloss greenish.

NESTING [Probably a bulky, basin-shaped nest of sticks lined with finer material high in a tree]; eggs four, greenish spotted with dark brown; size 41 × 28·5 mm.

REMARKS The black crow, whose voice is a weak 'caw' or 'ka', is most often seen by the edge of the sea where it walks on mudflats, exposed coral, or beaches, and flies to perch in mangroves, coconuts, or trees of the forest edge. Though it shuns both closed forest and mountains, the crow frequents lowland gardens and savannahs. Usually seen singly or in pairs, it may congregate in numbers where food is plentiful, such as about the refuse heaps near the Port Moresby airfield, and there the birds feed on almost any animal or vegetable matter they find; most of the food actually recorded was fruits of trees.

Large black crows are so similar over the whole Asia-Australia area, as well as in Europe and North America, that the grouping of them into species is controversial. Hence we accept the New Guinea bird as a separate species.

***Corvus fuscicapillus* (Gray)**

Brown-headed Crow. Length 18 in. Adults: head and neck all round dark brown, rest of upperparts black with a slight gloss; breast and abdomen brownish black; many feathers of head and body with white bases; bill very high with culmen arched; iris blue; bill, black (male), yellow with black towards tip (female); feet black. Wing 335 mm, tail 171 mm; culmen length 74–80 mm, height 25–30 mm; tarsus 63 mm. Immature: paler and more brownish with much white from bases of feathers showing through; bill yellow.

RANGE Aru Islands, lower Mamberamo River of north New Guinea, certain western Papuan islands.

SUBSPECIES Two, differing chiefly in size of bill:

a) *fuscicapillus* (Gray); Aru Islands and lower Mamberamo River (Taua); culmen 80 mm.

b) *megarhynchus* (Bernstein); western Papuan islands of Waigeu and Geimen.

REMARKS This crow is remarkable for its extraordinarily deep bill and for its fragmented range. This is a forest bird, which feeds on the fruit of trees.

***Gymnocorvus tristis* (Lesson and Garnot)**

Grey Crow. Length 20–22 in. Adults: colour variable, from upperparts

blackish brown with a slight gloss and underparts dark brownish grey to individuals with underparts and head greyish white and rest of upperparts greyish brown; individuals have been described as pure white; tail strongly rounded; iris blue (sometimes recorded as mixed grey and brown), area of bare skin about eye and lores pink; bill pinkish white to dark grey; feet pale yellow, pink or dirty white. Male wing 328 mm, tail 232 mm, culmen 72 mm, tarsus 58 mm. Female wing 325 mm.

RANGE New Guinea (lowlands, rarely up to 4,500 ft) and some satellite islands (Salawati, Batanta, Ron, Japen, and D'Entrecasteaux Archipelago).

REMARKS The blue eyes, pink face, and washed-out looking plumage give this crow a most unusual appearance, almost as though it were a mutant and its normal appearance should be something else. The pale type of plumage is much more common than the darker one, though both may be found in the same flock. The comparatively long tail of the grey crow gives it a rather slender appearance. Strangely enough, the bird which these pale grey crows most resemble superficially is the quite unrelated channel-bill cuckoo.

The grey crow is a fairly common bird in the treetops in the forest, where it goes about in small parties, often of five or eight individuals, and often one utters a hoarse, weak 'ka'. They are sometimes wary birds, and difficult to approach. Sometimes in the forest, a whole party of these crows breaks into a chorus of hoarse cries. This outcry has an excited quality as though the birds were 'mobbing' some predator, but we were never able to find any cause for the uproar.

The usual food of this species is fruits of forest trees; that of a climbing arum is a favourite. A flock sometimes alights on the bank of a river and the birds walk about there. It has been suggested that they eat refuse and that they may pick up gravel. It may also be that they come to the river to drink.

## Family Paradisaeidae *Birds of Paradise*

*(Forty-three species, thirty-eight in New Guinea)*

The birds of paradise form the most notable family of New Guinea birds, and thirty-eight of the forty-three species live in the New Guinea area; the other species living in northern Australia or in the Moluccas. Some species are rather plain, with little in the way of ornamentation and little sexual dimorphism, while in others the males are elaborately ornamented with bright colours and iridescence, bizarre tufts of plumes, or wattles. Wattles are also sometimes present in females.

The ornamented birds have elaborate displays, some construct display areas, and are polygamous, with the female alone carrying on nest duties. In other, plainer species, monogamous pairing takes place and the male shares nest duties. The nest is generally a cup- or basin-shaped affair on a branch, but two species nest in holes, and one builds a dome nest.

All birds of paradise are forest dwellers and are often common birds in the treetops, and their loud, harsh cries are conspicuous sounds of the forest. Fruit is an important, if not the sole, food of many birds, but some eat much animal food. The immature males may take a number of years to reach adult plumage in some species, and in such cases the young males, at first like the females, may assume a partial adult male plumage for some time and, even without the ornamental plumes, go through display activities and perhaps mate upon occasion.

Among the great number of birds of paradise skins sent to Europe during the heyday of the plume hunting for the millinery trade were a few specimens quite different from any known species. These were described and named. Intensive search in New Guinea, even special expeditions in quest of them, were unable to find their native homes. Finally, Professor Stresemann, of the University of Berlin, from a careful study of museum specimens, came to the conclusion that these rare 'species' whose home could not be found were actually hybrids between well-known species. Some of these hybrids involve crosses between such very distinct and highly decorated genera as *Astrapia, Epimachus, Parotia, Seleucides, Paradisaea,* etc. The occurrence of these hybrids is correlated with the breeding habits of these highly ornamented birds in which no pair is formed and the sexes come together only for mating.

The hybrid origin of some seventeen of these 'rare birds of paradise' has been widely accepted, but as some of them are still occasionally listed as species, a list of the names applied to them is given:

INTERGENERIC HYBRIDS

1 *Astrapimachus ellioti (Astrapia* × *Epimachus).*
2 *Pseudastrapia lobata (Epimachus* × *Paradigalla).*
3 *Loborhamphus ptilorhis (Paradigalla* × *Parotia).*
4 *Parotia duivenbodei (Lophorina* × *Parotia).*
5 *Loborhamphus nobilis (Lophorina* × *Paradigalla).*
6 *Lamprothorax wilhelminae (Diphyllodes* × *Lophorina).*
7 *Paryphephorus duivenbodei (Craspedophora* × *Lophorina).*
8 *Heteroptilorhis mantoui (Craspedophora* × *Seleucides).*
9 *Janthothorax mirabilis (Paradisaea* × *Seleucides).*
10 *Janthothorax bensbachi (Craspedophora* × *Paradisaea).*
11 *Neoparadisea ruysi (Diphyllodes* × *Paradisaea).*

12 *Cicinnurus lyrogyrus (Cicinnurus × Diphyllodes).*
13 *Rhipidornis gulielmitertii (Cicinnurus × Diphyllodes).*

INTRAGENERIC HYBRIDS

14 *Paradisaea maria (Paradisaea raggiana × P. guilielmi).*
15 *Paradisaea duivenbodei (Paradisaea minor × P. guilielmi).*
16 *Paradisaea mixta (Paradisaea minor × P. raggiana).*
17 *Paradisaea apoda luptoni (Paradisaea apoda × P. raggiana).*

### Synopsis of Genera of *Paradisaeidae*

(Females of *Loria, Loboparadisea* and *Cnemophilus* could be mistaken for bowerbirds related to *Amblyornis.*)

1 MANUCODIA Four species; length 12–18 in.; sexes alike; plumage glossy black, without special ornamentation, though plumage may be crinkled; bill nearly straight or stout.

2 PHONYGAMMUS One species; length 12–14 in.; similar to *Manucodia* but with lanceolate feathers on head and neck.

3 MACGREGORIA One species; length 14–16 in.; sexes alike; the only species with plumage black, orange band in wing and orange wattles.

4 PARADIGALLA Two species; length 9–15 in.; sexes alike; the only species with dull black plumage, naked forehead, and wattles at base of maxilla (yellow) and sides of mandible (blue).

5 DREPANORNIS Two species; length 13–14 in.; the only genus with a long (more than twice length of head), very curved bill, and short (about length of wing or shorter) tail. Sexes different: male chiefly grey and brown and black with ornamental flank or breast tufts; female barred below.

6 EPIMACHUS Two species; length 32–44 in.; the only genus with a long (more than twice length of head), very curved bill, plus a very long tail, much longer than wing. Sexes different: male mostly black or brown and black, with iridescent patches on back and ornamental breast and flank plumes; female without ornamental plumes; brown above, barred below.

7 ASTRAPIA Five species; length 15–46 in.; the only genus with a moderate (about as long as head) fairly straight bill and a long tail, somewhat longer to many times longer than wing. Sexes different: male mostly black with patches of vivid iridescence but no long ornamental plumes; female brown to black above, brown and black barred below.

8 PAROTIA Four species; length 9–17 in.; bill about as long as head;

tail shorter than to slightly longer than wing. Sexes different: male mostly black and the only genus with three wire-like projecting plumes tipped with rackets on each side of nape; female without ornamental plumes; mostly brown above and barred buffy or brown and black below.

9 LOPHORINA One species; length 9–10 in.; bill about as long as head; tail shorter than wing. Sexes different: male mostly black with iridescent patches; the only genus with an enormous nuchal cape and also a breast shield; female mostly brown above with underparts buffy grey barred blackish.

10 CRASPEDOPHORA One species; length 13–14 in.; bill longer than head, slightly curved; tail shorter than wing. Sexes different: male black with iridescent patches and with flank plumes elongated a few inches with filmy tips; female brown above, underparts barred buffy grey and blackish.

11 SELEUCIDES One species; length 11–12 in.; bill one and a half times length of head and slightly curved; tail shorter than wing. Sexes different: male black with iridescent areas and yellow (fading to white) flank plumes and abdomen; the only genus with long, black wire-like projections (six on each side, 8–10 in. long) from tips of flank plumes; female mostly brown above; underparts buffy grey barred blackish brown.

12 DIPHYLLODES Two species; 6–8 in. long (without central tail feathers); bill equals head or shorter; tail (without central projections) much shorter than wing. Sexes different: male green and blackish below; with glossy red or orange and yellow above and with central tail feathers narrow, elongate and curled; female brownish above, barred below.

13 CICINNURUS One species; length 5–8 in. (without projecting central tail feathers); bill shorter than head; tail (without central feathers) shorter than wing. Sexes different: male unique in having back and throat mostly red, and with central tail feathers projecting as wires with coin-like iridescent green curled tips; female brown above; underparts barred buffy grey and blackish.

14 PARADISAEA Seven species; length 12–16 in. (without tail 'wires'); bill about as long as head; tail (without central 'wires') shorter than wing. Sexes different: males unique in having large, filmy tipped flank plumes mostly red, orange, yellow and white or blue, and central tail feathers very much elongated as very narrow or wire-like or strap-like structures; females much like males but without flank plumes or elongated central tail feathers, but one species is barred below.

15 PTERIDOPHORA One species; length 8–9 in.; bill shorter than head, tail shorter than wing. Sexes different: male mostly black and yellow and unique in very long (two or three times body length) plumes, one from each side of nape, and consisting of a wire-like shaft with a series of horny flanges; female upperparts grey, underparts white barred black.

16 LORIA One species; length 8 in.; bill shorter than head; tail shorter than wing. Sexes different: male all black with iridescence on forehead and secondaries only; no ornamental plumes; female olive above, paler olive below.

17 LOBOPARADISEA One species; length 6–7 in.; bill shorter than head; tail shorter than wing. Sexes different: male brown and yellow above, yellow below; female olive above; buffy, obscurely grey streaked below.

18 CNEMOPHILUS One species; length 9–10 in.; bill shorter than head; tail shorter than wing. Sexes different: male upperparts yellow or orange with a narrow crest on forehead, underparts all chocolate-brown; female olive-green above, much paler below.

### Key to *Manucodia* Species

1 Plumage curled or crinkled: 2.
Plumage not curled or crinkled: *M. ater.*
2 Total length more than 15 in.: *M. comrii.*
Total length less than 15 in.: 3.
3 Breast glossed yellow-green: *M. chalybatus.*
Breast glossed purple-blue: *M. jobiensis.*

### *Manucodia ater* (Lesson)

Glossy-mantled Manucode. Length 13½ in. Adults: black birds with varying degrees of purple, blue and green gloss; feathers of head and neck short and somewhat velvety; mantle with high gloss, purplish to greenish; wings and tail more purplish glossed; breast and abdomen with greenish to purplish gloss with breast feathers slightly crisped; iris orange (brown in subadult); bill and feet black. Male wing 180 (166–206) mm, tail 149 mm, culmen 37 mm, tarsus 39 mm. Female wing 165 mm. Immature: sooty black.

RANGE New Guinea and satellite islands; lowlands, occasionally up to 3,000 ft.

SUBSPECIES Three:

a) *ater* (Lesson); western and central New Guinea, east in the north to Huon Gulf, in the south to Gulf of Papua; gloss more greenish; size small.

b) *subalter* (Rothschild and Hartert); eastern New Guinea, west in north to Huon Gulf, in south to Gulf of Papua; also Aru Islands and, strangely, the western Papuan Islands (Misol, Salawati, Waigeu, etc.); like *ater* but larger (wing to 204 mm), and gloss more purplish.
c) *alter* (Rothschild and Hartert); Tagula Island, Louisiade Archipelago; like *ater* but gloss on underparts more purplish and bill longer, culmen 41 mm.

NESTING AND DISPLAY The nest is made twenty to twenty-five feet up in a multiple fork of branches in a small forest tree; a rather neat cup of sticks, etc., lined with fine stems, leaves and rotten wood; eggs two, greyish white spotted and smudged with pale brown and sometimes with lines of dark brown; size 39 × 25·5 mm. Young hatch without down; skin blackish.

Birds pair monogamously; the courtship display apparently consists of a male slightly spreading and shaking his wings and tail and erecting the body feathers. Incubation takes between fourteen and eighteen days, and is undertaken by the female alone, with the male in attendance at a distance. The female spends from twelve to fifty-one minutes on the nest, and from five to fifty-one minutes away from it. Both sexes feed and brood the young and perform some nest sanitation.

REMARKS This unspecialized bird of paradise is common in the lower canopy of the forest where it feeds on fruits. It is often seen in pairs, and when in flight makes a heavy, silky, rustling sound. Its call is a long drawn out whistle, and, near the nest, a chattering call and a 'chug' of alarm.

### *Manucodia jobiensis* (Salvadori)

Jobi Manucode. Length 13 in. Adults: black with variable gloss, very like the next species, *M. chalybatus*, but lacking green gloss on throat and breast; head more greenish blue (not purple); tail relatively shorter and bill more slender; iris orange-red; bill and feet black. Male wing 177 mm (subspecies 171 mm), tail 133 mm, culmen 37 mm, tarsus 40 mm. Female slightly smaller. Young dull sooty black. First-year plumage sooty black, except for bluish gloss on wings and tail.

RANGE Japen Island and northern and western New Guinea; lowlands up to 1,600 ft.

SUBSPECIES Two very similar ones:
a) *jobiensis* (Salvadori); Japen Island.
b) *rubiensis* (Meyer); western New Guinea from head of Geelvink Bay, east in the north to Astrolabe Bay, in the south to Setekwa River; like *jobiensis* but smaller; wing 171 mm.

NESTING The nest is made eight feet up in the fork of a horizontal branch; a deep cup-shaped structure of roots, creepers, and leaves. Eggs two, pale pink, spotted and dotted with brown and grey, chiefly about the larger end; size 24 × 32 mm.

REMARKS This is apparently a common forest bird.

***Manucodia chalybatus* (Pennant)**

Green-breasted Manucode. Length 14½ in. Adults: black birds with variable high gloss; feathers of head short and somewhat velvety; feathers of lower throat and breast crinkled, those of mantle slightly so; crown, back, wings and tail richly purple glossed; the feathers of mantle with velvety bars; hind neck, chin and sides of head glossed blue-green; pectoral band glossed yellowish green; iris reddish; bill and feet black. Male wing 179 mm, tail 153 mm, culmen 47 mm, tarsus 41 mm. Female wing 172 mm. Nestling dull black.

RANGE Misol Island and all New Guinea lowlands to 5,800 ft (most common 1,900 to 4,600 ft).

NESTING The nest is placed in a fork of a branch 'like *Oriolus* nests'; of brown wiry stalks and leaves, lined with finer stalks and fibres. A single white to creamy egg, with brown and grey markings; size 36 × 27 mm.

***Manucodia comrii* (Sclater)**

Curl-breasted Manucode. Length 17½ in. Adults: black birds with a high variable gloss, with a large crest of curled, crinkled feathers, and with the feathers of neck and body extensively curled and crinkled, and central tail feathers recurved and twisted; neck and upper back glossed purple; sides of head, throat, and breast glossed steel-green; lower breast and abdomen glossed purple and steel-green; many of feathers with velvety, subterminal black bars; iris red; bill and feet black. Male wing 242 mm (to 229 mm, subspecies), tail 177 mm, bill 62 mm, tarsus 54 mm. Female wing 220 mm.

RANGE Eastern satellite islands of New Guinea; lowlands.

SUBSPECIES Two similar ones:

a) *comrii* (Sclater); D'Entrecasteaux Archipelago.
b) *trobriandi* (Mayr); Trobriand Islands; like *comrii* but smaller; male wing 229 mm.

NESTING The nest hangs in the fork of a branch; made of twigs and vines, and lined with twigs of a vine; outside nest is ornamented with large, thick leaves, and in the bottom are pieces of rotten wood. Eggs two, pale salmon, with cinnamon, dark brown, and grey spots and blotches; size 44 × 30 mm.

***Phonygammus keraudrenii* (Lesson and Garnot)**

Trumpet Bird. Length 12½ in. Adults: black birds with a high, variable gloss and with many feathers of head and neck lanceolate, and pointed at tip, including a lengthened tuft each side of crown; upperparts generally glossy purplish violet to steel-green; head and neck all round glossed with steel-green to steel-blue; crown plumes very short; occipital tufts much elongated and lanceolate; throat and neck plumes greenish to greenish blue and ranging from moderately long to very long and lanceolate, in the latter case forming a circular collar; wings and tail violet-blue, less often steel-green; remaining underparts burnished oil-green to dark violet blue-green, occasionally washed with purple; undersides of wing and tail dull blackish; iris orange-red (male), orange (female), and brown (subadult); bill and feet black. Male wing 165 (159–69) mm, tail 125 mm, culmen 36 mm, tarsus 37 mm. Female wing 158 mm.

RANGE New Guinea lowlands occasionally up to 6,000 ft, the Aru and D'Entrecasteaux Archipelagos, and north-eastern Australia.

SUBSPECIES IN NEW GUINEA Seven fairly well marked races:

a) *keraudrenii* (Lesson and Garnot); Vogelkop, Onin Peninsula and Weyland Mountains; a small (wing 159 mm), generally steel-greenish blue form with purplish wings and tail.
b) *jamesii* (Sharpe); Aru Islands, southern New Guinea (Mimika River east to Hall Sound); like *keraudrenii* but larger (wing up to 169 mm) and head tufts longer.
c) *purpureo-violaceus* (Meyer); mountains of south-eastern New Guinea (2,250 to 5,800 ft); like *keraudrenii* but back purplish violet, not steel-green.
d) *mayri* (Greenway); Herzog Mountains; like *purpureo-violaceus* but with a relatively longer tail.
e) subspecies?; Adelbert Mountains; like *keraudrenii* but wings and tail green, not blue.
f) *neumanni* (Reichenow); Lordberg (4,850 ft), Sepik Mountains and mountains of the Wahgi Divide; like *keraudrenii* but lower back, rump, wings and tail dark bluish violet, not greenish.
g) *hunsteini* (Sharpe); Fergusson, Goodenough and Normanby Islands, D'Entrecasteaux Archipelago; like *keraudrenii* but back dark bluish purple not steel-green and head tufts longer, more greenish, less bluish.

NESTING AND DISPLAY [High in fork of branch; a shallow cup of vines. Australian data.] Eggs two, pale pink spotted all over with brownish red and grey; size 35 × 24 mm.

This bird probably forms monogamous pairs. Courtship includes the

male chasing the female through the trees with occasional pauses for displays in which the birds perch a foot or so apart, male turns towards female, then raises and spreads its wings, erects the body feathers, and gives a single loud, harsh call, and then resumes a normal pose. Presumably both sexes help in some nest duties at least.

REMARKS This is a common species in rain forests in the Fly River area, where it was usually found in substage and treetops. It was usually seen singly or in pairs and it came to fruiting trees to feed. Its call, commonly heard, was a loud, harsh squawk. The species is notable for having a loop of the windpipe extending from the lower neck down over the breast, between skin and breast muscles, and in old males this develops several coils. This lengthened structure probably helps to produce the low calls.

### *Macgregoria pulchra* (De Vis)

MacGregor's Bird of Paradise. Length 15–16 in. Adults: generally velvet black except primaries which are ochraceous orange with black tips; massive orange lappet wattles encircling rear half of eye; iris dark reddish brown; bill black; feet bluish grey. Male wing 192 mm (one subspecies 203 mm), tail 137 mm, bill 35 mm, tarsus 68 mm. Female wing 172 mm. Nestlings dull black.

RANGE Mountains of western and south-eastern New Guinea; 9,000 to 13,000 ft.

SUBSPECIES Two similar ones:

a) *carolinae* (Junge); Snow Mountains; male wing 192 mm.
b) *pulchra* (De Vis); mountains of south-eastern New Guinea; like *carolinae* but larger, male wing 203 mm.

NESTING AND DISPLAY The nest is a bulky cup of herbaceous and woody stems and much coarse moss, built thirty-five to fifty feet up in a Podocarpus tree towering well above low mossy forest; lined firmly with slender stems and floored with some small leaves. A single earthy pink egg, sparsely spotted with brown; size 39 × 27·5 mm. Natal down fairly plentiful above, and sooty black.

A monogamous pair is formed. Courtship includes a chase in which two (occasionally several) birds take part. The chase includes hopping through the treetops, and flying with a great rustling noise of wings from tree to tree in a limited area, with pauses for preening and resting. Occasionally clicking noises are uttered. The female alone builds the nest and incubates, with the male in attendance. The female is on the nest for about fifteen minutes, and then off for up to ten minutes. Both sexes feed the young at short intervals (one to thirteen minutes).

REMARKS The MacGregor's bird of paradise is a common bird in the

high altitude pine (*Podocarpus*) forests, and the trees to the timber line, where it is a conspicuous species and not at all shy. It moves about in the treetops in couples, rarely singly. These are rather active birds, hopping from branch to branch, often flitting wings and tail, and they appear grotesquely nervous for such large birds. The flight is heavy with noisy wing beats interrupted by short glides, and the call, often heard, is a wheezy, not very loud 'cheu' several times repeated. The food is fruit, often that of the *Podocarpus*.

**Key to *Paradigalla* Species**

Total length more than 12 in.; tail wedge-shaped: *P. carunculata.*
Total length less than 11 in.; tail slightly rounded: *P. brevicauda.*

***Paradigalla carunculata* (Lesson)**

Long-tailed Paradigalla. Length 14¾ in. Adults: black birds with large yellow wattles in front of eye; upperparts generally velvet-black suffused in certain lights with dark bronze-green, especially on the wings and tail; crown and nape glossy with short, dark, scale-like steel-blue feathers; sides of head, neck and throat somewhat glossy velvet blue-black; remaining underparts and uppersurfaces of wings and tail blackish brown; wattles at base of maxilla lemon-yellow to yellowish green with the outer borders near brick-colour; wattles at sides of lower mandible violet-blue on their upper portions and yellowish orange-red below. Male wing 195 mm, tail 150 mm, culmen 35 mm, tarsus 52 mm. Female: much smaller (wing 160 mm) and less glossy.

RANGE Arfak Mountains from 4,800 to 7,000 ft.

REMARKS This is a little known species. A race, *intermedia* (Ogilvie-Grant), may prove to live in the Snow Mountains and be separable on the basis of its shorter tail (100 mm long) and all-yellow wattles, Dr Ripley tells us.

***Paradigalla brevicauda* (Rothschild and Hartert)**

Short-tailed Paradigalla. Length 9¼ in. Adults: black birds with yellow wattles in front of eyes; upperparts generally velvety black and strongly suffused with dark bronze, especially on the exposed edges of the secondaries and on the upper wing-coverts where the greenish bronze is iridescent; crown and nape with short, glossy, scale-like, deep steel-blue feathering; sides of head, neck and throat dull glossy, velvet blue-black; remaining underparts and undersurfaces of wing and tail blackish brown; wattles at base of maxilla bright lime-yellow tinted with green at base; wattles at sides of lower mandible bright ultramarine blue above and yellow below; inside of mouth (male) pale bluish aqua; iris blackish brown; bill black; feet dark grey. Male wing 157 mm, tail

49 mm, culmen 37 mm, tarsus 47 mm. Female: generally less metallic, more blackish brown.

RANGE Weyland and Snow Mountains to Central Highlands, New Guinea, from 5,500 to 7,800 ft.

REMARKS This wattled bird of paradise is uncommon and usually found sitting rather inactively in the lower substage of the forest. Its food consists of fruit, insects, and small frogs.

**Key to *Drepanornis* Species**

Bill black: *D. albertisii.*
Bill pale horn-colour to white: *D. bruijnii.*

***Drepanornis albertisii* (Sclater)**

Black-billed Sicklebill Bird of Paradise. Length 14 in. Adult male: with a very long, curved bill; tail shorter than wing; plumage rufous brown above, sooty brown below, and with ornamented tufts of feathers on sides of breast and flanks; upperparts rusty brown, becoming tawny chestnut to pale ochraceous on rump and tail; sides of head with naked areas of blue skin; area in front of eyes black glossed green to rose and feathers projecting above eyes as little horn-like tufts; throat black glossed with bronzy green and violet; rest of underparts sooty brown with a black line across lower breast (where feathers have concealed white bases), and long tuft (up to 2½ in.) of feathers on sides of breast darker, more purplish bronze and long tufts (up to 4 in.) of feathers on flanks dark brown and tipped with purple; iris brown; bill black; legs grey; wing 154 mm, tail 140 mm, culmen 75 mm, tarsus 36 mm. Female: like male on upperparts, but without iridescent patch in front of eye; differs on underparts in being buffy, with fine bars except on upper throat, which is obscurely streaked; wing 148 mm.

RANGE Mountains of New Guinea from about 2,000 to 7,200 ft.

SUBSPECIES Four rather similar ones:

a) *albertisii* (Sclater); Arfak and Wandammen Mountains; rump and tail strongly saturated with tawny brown.
b) *inversus* (Rothschild); northern slopes of central ranges (from Weyland Mountains to Sepik region); like *albertisii* but rump and tail much paler.
c) *geisleri* (Meyer); mountains of Huon Peninsula; very like *albertisii.*
d) *cervinicauda* (Sclater); mountains of south-east New Guinea including Herzogs; like *albertisii* but rump and tail as in *inversus*: size smaller.

NESTING A rather shallow basin nest is made between the arms of a horizontal fork of a thin branch; constructed of black wire-like rootlets

and wiry grass. Eggs, cream colour tinged reddish, spotted all over with oblong dashes of reddish brown and grey, more plentiful on larger end; size 34 × 25 mm.

The flank and breast tufts are presumably spread in display.

REMARKS An intriguing suggestion as to a specialized use for the long, curved bill is given by an early comment that this species feeds around dead trees and fallen trunks, searching for insects.

***Drepanornis bruijnii* (Oustalet)**

White-billed Sicklebill Bird of Paradise. Length 13½ in. Adult male: with very long curved bill; tail shorter than wing; plumage above dark brown; underparts grey with throat and breast blackish; an ornamental tuft of feathers (up to 1½ in. long) on sides of lower neck. In more detail: upperparts dark brown changing to more rusty brown on wings and chestnut on tail and crown with short, black-tipped feathers with a pink-purple gloss above eye; forehead and side of head about areas behind eye naked; upper throat to ear-coverts black with a faint gloss and an iridescent purple spot each side of throat below eye; lower throat blackish brown with a greenish gloss and with lateral tufts which are black with a subterminal band of brilliant copper; breast and abdomen smoky grey, with longest lateral feathers tipped with black and an iridescent blue-purple margin, and a shorter series glossed green; iris brown; bill pale horn to whitish; feet grey; wing 165 mm, tail 111 mm, culmen 75 mm, tarsus 34 mm. Female, upperparts much like male, but without iridescent black on head; underparts quite different, without ornamental tufts, and buffy barred with black which becomes much finer anteriorly; wing 159 mm.

RANGE Lowlands of north-western New Guinea from the south-east coast of Geelvink Bay east to near Humboldt Bay.

REMARKS This is a very distinct, little-known forest species of local distribution in the vicinity of rivers near the coast.

**Key to *Epimachus* Species**

1 Underparts not barred: adult males 2.
  Underparts barred: females 3.
2 Underparts black: *E. fastosus*.
  Underparts dark brown: *E. meyeri*.
3 Barring whitish: *E. fastosus*.
  Barring buffy: *E. meyeri*.

***Epimachus fastosus* (Hermann)**

Black Sickle-billed Bird of Paradise. Adult male: length 44 in. (including

very long tail). Adult male: a black bird with long, curved bill; very long pointed tail (up to 33 in. or more); patches of iridescence and with long, dark ornamental tufts on sides of body. In detail: upperparts velvet black with weak violet-purple reflections; crown, and an area on back iridescent coppery blue-green and tail glossed purple-blue; sides of head glossed with blue-green; wings black with blue-green reflections; chin, throat, and sides of upper neck brownish black suffused with purple; rest of underparts brownish black; with at sides of upper breast a large fan of broad-tipped feathers (up to 150 mm long) burnished with green and purple towards tips and broadly tipped with iridescent violet and behind this fan a larger one that is velvet-black; at sides of lower breast another fan (with plumes up to 250 mm in length) against which shorter broadly iridescent tipped plumes are displayed; iris red to reddish orange; bill black; legs pale blue with blackish toes; post-ocular skin black; inside of mouth egg-yellow; wing 209 mm (subspecies 198–222 mm), tail 825 mm, tarsus 55 mm, culmen 81 mm. Female: upperparts, including wings and tail, olive-brown with crown dark chestnut brown; sides of head, chin, throat, and upper chest blackish; remaining underparts and under wing-coverts with black and whitish bars which become wider posteriorly; primaries largely pale chestnut with dark tips; no ornamental plumes; wing 175 mm, tail 338 mm, tarsus 52 mm.

RANGE Forests of western and central New Guinea, from 4,200 to 7,700 ft.

SUBSPECIES Three rather similar ones:

a) *fastosus* (Hermann); mountains of Vogelkop (Arfak and Tamrau) from 5,200 to 7,700 ft; male generally brownish black; wing 198 mm.
b) *atratus* (Rothschild and Hartert); Wandammen, Weyland, Nassau, and Oranje Mountains; like *fastosus* but male more blackish below.
c) *stresemanni* (Hartert); Schraderberg, Sepik, Hagen and Hindenburg Mountains; like *fastosus* but wing longer; male wing up to 222 mm; from 4,200 to 7,000 ft.

NESTING AND DISPLAY The nest is not known. A display was recorded in the wild by Ripley: a male, sitting high on a bare tree branch, with pectoral tufts spread out and up, like raised arms, tail partly spread, suddenly uttered a loud, penetrating whistle, then dived off the branch, came out of the dive with spread wings and sailed up to the same perch, almost as if on the rebound. A female was sitting nearby, on a lower perch.

REMARKS This bird is found in mountain forests and is not uncommon locally. Its loud, liquid, whip-like notes are sometimes conspicuous.

***Epimachus mayeri* (Finsch)**

Brown Sickle-billed Bird of Paradise. Male: length 39 in. (including very long tail). Adult male: a dark bird with an olive-brown breast; long, curved bill; very long, pointed tail (up to 30 in. long); and with long, dark, ornamental tufts on sides of body. In detail: upperparts purplish black with dull violet purple reflections; crown, sides of head, sides of throat, and an area on central back and rump iridescent blue-green (the patch on side of throat with much purple); tail black glossed purple-blue; wings blackish; chin and throat glossed purple; rest of underparts dull olive-brown suffused with purple on sides, becoming paler on abdomen; at sides of upper breast a large pectoral fan of dark, broad-tipped feathers (up to 125 mm long), many of which are tipped with violet-blue; behind these, a course of longer sooty black plumes; at side of breast another fan (with feathers up to 195 mm in length) grey or white tipped in some subspecies, against which a course of shorter, pinkish-violet-tipped plumes are spread in display; the longest plumes in the fan are non-iridescent, disintegrated ones that (in the folded position) extend backward several inches beyond the base of the tail; iris pale blue; bill black; feet black; side of mouth yellowish green; inside of mouth bright yellow; wing 185 mm, tail 765 mm, tarsus 52 mm, culmen 70 (65–80) mm. Female: upperparts olive-brown tinged with chestnut on mantle and with crown to hind neck ochraceous chestnut; side of head sooty brown; chin and throat sooty with indistinct small buff flecks; remaining underparts, including under wing and under tail-coverts, pale buff with brown to blackish bars; no ornamental plumes; wing 172 mm, tail 398 mm.

RANGE Weyland and Snow Mountains to south-eastern New Guinea, from 5,400 to 10,000 ft.

SUBSPECIES Four rather similar ones:

a) *meyeri* (Finsch); mountains of south-eastern New Guinea (west to Mt Misim and Herzog Mountains); flank plumes pale brown.
b) *bloodi* (Mayr and Gilliard); Central Highlands, mountains of eastern New Guinea (Hagen Mountains, etc.); like *meyeri* but flank plumes grey.
c) *albicans* (van Oort); Oranje and Sepik Mountains; like *meyeri* but flank plumes whitish.
d) *megarhynchus* (Mayr and Gilliard); Gebroeders and Weyland Mountains; like *meyeri* but bill longer.

NESTING AND DISPLAY The nest is a cup of stringy living moss and small vines attached to slender branches or a crotch in a small tree in the lower tier of the mountain forest. The nest is lined with slender rootlets and some dried, skeletonized leaves. A single oval cinnamon

egg with bold brown and reddish brown longitudinal streaks on larger half, elsewhere sprinkled with small brown and lavender spots; size 40 × 27·5 mm.

Two types of display are recorded. In one, the body is drawn erect, tail slightly opened, wings tightly closed; breast feathers, encircled by the decorative flank plumes are widely spread; pectoral shields thrown straight up, so they extend far above the head, wrapping it closely. At the upper extremity, the shields are narrow and compressed; at their bases, they broaden gradually to pick up the line of the spread breast feathers; the beak is widely opened to show the bright yellow mouth. This position is sometimes held for five seconds; sometimes the bird rotates the body in a series of short jerks until facing along the perch, then reverses until facing in the opposite direction, and this may be continued for two to five minutes.

In the other display, the bird, standing on the perch, expands the breast feathers which form a fringe around the sides. He then gives his rattling call and turns his breast upward, breast feathers spread to fullest extent and the body appearing flattened, the short feathers of the upper breast turned upward about the head, and the iridescence of face and throat become very conspicuous; wings closely folded, tail slightly spread, neither vibrated; beak closed (observed in captivity by Crandall).

REMARKS This is a common bird in the upper parts of the forest trees where it perches on branches and sides of trunks, and probes with its long, curved bill into clumps of moss and other epiphytes, and into the spaces between the pandanus leaves presumably for insects and tree frogs which form an important part of its diet. It also visits fruit trees and eats fruits. A bird in captivity wedged a piece of food into a crevice and pecked pieces off it, rather than holding the food under one foot. Its calls include a sudden, deep rattle, like that of a pneumatic hammer, given in two short bursts. One male violently flexed its semi-closed wings as it gave this call.

Where the two species of long-tailed sickle-bills occur on the same mountains, they replace each other altitudinally; the brown-breasted species living at the higher altitudes.

**Key to *Astrapia* Species**

1 Abdomen not barred: males 2.
  Abdomen barred: females 6.
2 Tail with white: 3.
  Tail all black: 4.
3 Tail white with outer third black; less than 12 in. long: *A. splendidissima.*

Central tail feathers white with narrow black tips; more than 24 in. long: *A. mayeri.*

4 Abdomen uniform oil-green: 5.
Abdomen black: *A. stephaniae.*

5 Iridescent coppery line on side of neck: *A. nigra.*
No such line on side of neck: *A. rothschildi.*

6 Abdomen boldly barred black and brownish: 7.
Abdomen blackish with narrow buffy or whitish bars: 9.

7 Crown heavily glossed green (Central Highlands): *A. mayeri.*
Crown faintly glossed blue at most: 8.

8 Tail 11 in. or less: *A. splendidissima.*
Tail over 12 in.: *A. stephaniae.*

9 Inner edges of wing quills ochraceous (Arfak): *A. nigra.*
Wing quills entirely blackish (Huon Peninsula): *A. rothschildi.*

***Astrapia nigra* (Gmelin)**

Arfak Astrapia. Length 30 in. (including long tail). Adult male: a dark, mostly black bird with iridescent area, nearly straight bill, and a very long (up to 22 in.) graduated tail with central feathers very broad. In detail: upperparts black with crown and nape faintly glossed, hind neck with a brilliant iridescent green fan of feathers, and back tinged deep bronze changing to purple gloss on lower back and violet on tail; sides of neck with long velvety black feathers; chin iridescent blue; throat, upper breast and sides of head and neck velvety black with posterior feathers lengthened and slightly recurved, and with a stripe of brilliant coppery iridescence from below eye, down side of neck, and across breast; lower breast and abdomen dark oil-green with a line of iridescent blue-green down each flank; iris dark brown; bill black; feet grey-brown; wing 172 mm, tail 550 mm (central feathers 65 mm broad), culmen 37 mm, tarsus 44 mm. Female: upperparts generally brownish; head all round, throat and upper breast blackish brown with faint purplish reflections; remaining underparts blackish with very narrow buffy bars; wing quills above with narrow ochraceous edges; tail above blackish brown; iris brown; bill and feet black; wing 163 mm, tail 292 mm, culmen 40 mm.

RANGE Arfak Mountains from 5,400 to 7,100 ft.

REMARKS This bird is found in the treetops of the forest.

***Astrapia splendidissima* (Rothschild)**

Splendid Astrapia. Male: length 17 in. (including tail 8–9 in. long). Adult male: a black and green bird with iridescent areas, nearly straight bill, and moderately long much graduated tail, feathers broad at tip and with much white in central and basal portions. In more detail: top

and sides of head iridescent yellowish green; hind neck with lengthened feathers forming a cape of iridescent blue-green tinged purple; back and wings blackish glossed pinkish purple changing to sooty black on rump and upper tail-coverts; central tail feathers white with somewhat expanded black tips, lateral ones white at base with broader black tips; throat oily green more or less glossed with blue-green and bordered with a band of blue-black; a stripe from below eye down side of neck iridescent coppery red joining a similar but broader band across upper breast; breast and abdomen bright oil-green; iris dark brown; bill black; feet bluish grey; wing 133–42 mm, tail 200–45 mm, culmen 41 mm, tarsus 37 mm. Female: blackish brown above; head, neck all round and upper breast blackish and slightly glossy; remaining underparts buffy to ochraceous with narrow blackish bars; base of central four rectrices broadly white, otherwise wings and tail blackish brown; iris grey-brown; wing 138 mm, tail 198–255 mm, culmen 39 mm.

RANGE Weyland and Snow Mountains to Sepik Mountains, from 7,000 to 10,000 ft.

SUBSPECIES Three rather similar ones:

a) *splendidissima* (Rothschild); Weyland Mountains; back pinkish purple; tail short, 200 mm, with small spatulate tips.
b) *helios* (Mayr); Oranje and Nassau Mountains; like *splendidissima* but tail longer, 235 mm.
c) *elliott-smithi* (Gilliard); Hindenburg and Victor Emanuel Mountains; like *splendidissima* but back darker, more plum-purple, and tail longer, 245 mm, with larger spatulate tips.

REMARKS This is a fairly common bird in the higher mountain forest up to the timber line. It hops about in the branches and among vines, eating insects, tree frogs and lizards, and visiting fruiting trees for the fruit which is a considerable part of its diet. Adult males are rarely seen even in areas where no plume hunting has ever been done.

### *Astrapia mayeri* (Stoner)

Ribbon-tailed Astrapia. Male: length 46 in. (including very long tail). Adult male: a black bird with patches of iridescence and central pair of tail feathers very long (up to 36 in.), narrow and white with black tips. In more detail: feathers of forehead (elongated and projecting over basal half of bill) black with iridescent green tips; crown and nape iridescent green; ear-coverts and sides of neck with somewhat lengthened feathers which are velvety black with a purple sheen; hind neck and foreback with a cape of somewhat lengthened feathers which are velvety black with a dull bronze sheen; rump and upper tail-coverts velvety black; central pair of tail feathers narrow, pointed, very long

(up to 900 mm), narrow (20–30 mm), and white with black tips; other tail feathers short (62–125 mm), black, and pointed; wings black; throat and malar region iridescent green-blue; breast with broad velvety black, somewhat lengthened feathers, the posterior ones tipped with iridescent copper to form a line across breast; lower breast and abdomen black with a faint bronze gloss; iris brown; bill black; inside of mouth pale green; feet grey; wing 179 mm, tail 976 mm, culmen 44 mm, tarsus 45 mm. Female: crown and nape iridescent green; back black; rump black tinged bronze; wings and tail dark brown (tail sometimes with some white and with white shafts); side of head and throat black glossed greenish; breast glossy black, lower breast and abdomen barred buffy brown and black; wing 155 mm, tail 285 mm.

Hybridization with *Astrapia stephaniae* occurs, giving mixed populations.

RANGE A very restricted area in the Central Highlands: on Mt Giluwe, Mt Hagen and the mountains of the central divide immediately (perhaps within eighty miles) to the westward; 7,800 to 10,000 ft.

This is the only species of *Astrapia* which comes in contact with another species and does so only on the extreme eastern part of its range where *A. stephaniae* also occurs but at a slightly lower altitude (up to 8,000 ft). The two show only a small altitudinal overlap here, and hybridization occurs. (See American Museum Novitates (1952) No. 1551.)

NESTING AND DISPLAY The nest is a firm, shallow cup of slender vines and mosses made on a foundation of leaves, thinly lined with fine rootlets and vines; one nestling (native collected, from high in a tree?).

In captivity the following was recorded, perhaps the preliminary to a display: a male, within two feet of an adult female, gave a raucous 'grrrow, grr, grr', followed by a hoarse cawing. The male stood high on its legs, tipped its head sideways, letting the wings droop, then holding them high over the back. Then he flew from perch to perch (six feet) landing with a thump and twitching the long white tail from side to side. The display in the wild probably takes place high on a branch.

REMARKS On Mt Hagen this was one of the most abundant birds living in the upper part of the forest trees. A male watched while feeding, moved about quietly in the branches of a tall, thin tree, sometimes crawling or climbing on the outer branches and pecking at the fruit, green in colour, which in size matched the 'pom-pom' of feathers at the base of the bird's bill.

This was the last species of bird of paradise to be discovered, and was described only in 1939, following the opening up of the Mt Hagen area which began in 1933.

***Astrapia stephaniae* (Finsch and Meyer)**

Princess Stephania Astrapia. Male: length 32 in. (including long, 24 in., broad tail). Adult male: a blackish bird with patches of iridescence, a fairly straight, short bill, and a very long black or mostly black tail. In more detail: crown and nape iridescent green-purple; hind neck velvety black; back black tinged bronze; rump velvety black; tail black glossed purple (shafts white basally, feathers broad; wings black; sides of head iridescent green and purple; chin, throat and upper breast iridescent green-blue; breast with a broad velvety black, slightly bronzed band followed by a narrow, iridescent coppery line; lower breast and abdomen black with indistinct greenish or coppery tips to feathers; iris brown; bill black; inside of mouth pale green; feet bluish grey; wing 169 mm, tail 610 mm, central feathers 60 mm broad, culmen 36 mm, tarsus 44 mm. Female: upperparts blackish, the feathers tipped bronzy brown, and the crown glossy blackish brown; rest of underparts buffy to ochraceous barred black; wings and tail blackish brown; wing 152 mm, tail 333 mm.

RANGE South-eastern New Guinea west to Mt Hagen; from 5,000 to 9,000 ft. The range of this species overlaps that of *A. mayeri* in a small area where hybridization occurs (see under *A. mayeri*).

SUBSPECIES Three similar ones:

a) *stephaniae* (Finsch and Meyer); south-eastern New Guinea; female wing 151 mm.
b) *ducalis* (Mayr); Mt Hagen area to Herzog Mountains; like *stephaniae* but female more blackish above and wing shorter; female wing 145 mm.
c) *feminina* (Neumann); Sepik Mountains (Schraderberg); female wing 146–52 mm; differs from *stephaniae* and *ducalis* in more rufous, less buffy, underparts.

NESTING AND DISPLAY The nest is a thick, shallow cup of large leaves and creepers lined with rootlets; placed high in a forest tree (native collected); a single pale brown egg with deep brown longitudinal streaks, a few paler, red-brown spots on larger end; size 36·5 × 25·4 mm (42·5 × 28 mm another record).

The display takes place high in a forest tree. In one type of display the male sat on a horizontal branch, tail hanging down in an inverted V. The wings were then lifted so the primaries were at right angles to the body and the 'wrists' seemed to touch over the back. The head was pulled down so the neck was crook-shaped. This pose was held for three seconds.

REMARKS This is a common bird in the high mountain forests where, singly, in pairs, or in small groups, it moves about in the branches of the

upper half of the forest. Apparently fruit is its main diet, and it may chase big honeyeaters from a fruiting tree. One of its calls, that of the male, is a shrill 'quee' repeated a number of times; others heard from the female were a weak, cat-like 'meow', and a plaintive 'quee'. All the Astrapias are apparently much less vocal than many of the other birds of paradise which are noted for loud, harsh cries. The flight of the male produces a rustling sound, as with some other species. In some localities, natives shoot the displaying males from a blind placed in a treetop. The natives use the tail feathers of both *Astrapia* and *Epimachus* in their head-dresses.

***Astrapia rothschildi* (Foerster)**

Huon Astrapia. Male: length 25 in. (including long tail); a black bird with iridescent patches and a 13 in., very broad tail. Adult male plumage: crown black glossed blue; nape iridescent coppery; hind neck with somewhat elongated black feathers tipped with pinkish purple and green; rest of upperparts black, the back heavily tinged greenish bronze, the tail with purple gloss; sides of head and throat black glossed blue; upper breast velvety black with somewhat elongated feathers with a faint blue gloss; this is followed by a narrow breast band of iridescent coppery bronze; lower breast and abdomen deep oil-green with iridescence on some of lateral breast feathers; wing 187 mm, tail 340 mm, central feathers to 75 mm broad, culmen 40 mm, tarsus 45 mm. Female: upperparts blackish brown, more black on crown; side of head, throat and upper breast black; rest of underparts black with fine whitish barring; wing 157 mm, tail 267 mm.

RANGE Huon Peninsula, from 4,800 to 7,500 ft, in mountain forests.

NESTING AND DISPLAY The egg is pinkish cinnamon with pale liver-brown blotches at larger end, a number of grey longitudinal streaks all over surface with larger and darker ones round the centre; size 37 × 28·5 mm. (Rothschild.)

Display in captivity is recorded as of two types. In one, the bird stands erect on a perch, tail pushed forward and slightly spread; blue breast gorget widely spread and flattened, its fiery golden margin glowing; the green feathers of breast also expanded laterally. The bird remained rigid for about ten seconds, making no sound. Sometimes the lateral tail feathers are spread and closed rapidly. In the second type the bird is tipped backward under the perch, the body nearly horizontal; head and neck turned upward at one extremity, the tail at the other so the bird formed a semicircle. The gorget and the feathers of the abdomen were widely spread; ear-coverts spread upward around the head joining the elevated ruff of the nape; wings tightly pressed against the body and feathers of back expanded to partly cover them; tail

upright and widely expanded at first, then lateral feathers opened and closed rapidly. This display lasted ten to fifteen seconds and was repeated at four to five minute intervals. No sound was uttered during the performance. (Crandall, 1932.)

REMARKS The only sound this species was heard to make in captivity was an occasional thin, jay-like 'kak—' which seemed to serve as either call or alarm.

### Key to *Parotia* Species

1 Tail more than 6 in. (Huon Peninsula): *P. wahnesi.*
Tail less than 6 in.: 2.
2 Underparts solidly black: adult males 3.
Underparts barred: adult females 5.
3 With white flank plumes: *P. carolae.*
Without white flank plumes: 4.
4 Tail $4\frac{1}{2}$ in. or more: *P. sefilata.*
Tail $3\frac{1}{2}$ in. or less: *P. lawesi.*
5 Superciliaries broadly white: *P. carolae.*
No white on superciliaries: 6.
6 Tail more than $4\frac{1}{2}$ in. long: *P. sefilata.*
Tail less than $4\frac{1}{2}$ in. long: *P. lawesi.*

### *Parotia sefilata* (Pennant)

Arfak Six-wired Parotia. Length 12 in. Adult male: upperparts including wing and tail velvety purplish black with a silvery white patch on forecrown, an iridescent green-violet patch on nape, and above ear-coverts a tuft of short hair-like plumes from which spring three greatly elongated wire-like shafts (up to 185 mm) each tipped with a black oval feather racket; underparts purplish black with a slight gloss; lower throat with a broad iridescent patch of golden-copper-blue and purple; feathers of flanks elongated and broad forming an ornamental tuft about 110 mm long; iris dark blue with an outer yellow ring; bill black; feet greyish black; wing 164 mm, tail 130 mm, exposed culmen 16 mm, tarsus 53 mm. Female: crown and hind neck black; rest of upperparts brown becoming olivaceous brown on wings and tail; sides of head and sides of neck black with line from gape grey flecked with black; throat greyish, narrowly flecked and barred with blackish brown; rest of underparts greyish buff narrowly barred with brownish black; wing linings deep ochraceous; wing 155 mm, tail 129 mm.

RANGE Mountains of the Vogelkop and Wandammen Mountains, near head of Geelvink Bay, 3,800 to 5,800 ft.

DISPLAY A dance area about three feet across and irregular in outline

is cleared on the forest floor in dense undergrowth, with horizontal branches just above it. This arena is the station of a single male who keeps it clear of leaves, etc., by throwing them aside with his bill. During the display, which is done on the ground, the male flies down from one of the horizontal branches, raises its head, bill pointed up, and extends its neck, turns the racket-tipped head plumes forward, sideways and downwards, and spreads the flank plumes around the body like a skirt in the 'umbrella' pose. The silver-white feathers of the forecrown are raised, and the head is bent forward against the breast. Then the head is swiftly thrown forwards to left and right swinging the racket-tipped head plumes in all directions and the flank plumes spread out horizontally, practically encircling the body. Soon the male stretches its legs, puts its head in an almost horizontal position, and commences to dance in a half circle on stiff legs, swinging the head back and forth. Suddenly the bird stops, relaxes its plumes and flies up to perch above the dance area, whence it frequently caws (Bergman, in the wild).

Other observations made in captivity indicate considerable variation in elaboration of the display. A preliminary flapping of wings and spreading of tail; a stiff, erect pose with plumes held close to the body; various poses of head and head plumages; and a more or less horizontal pose with posterior part of body (tail?) raised.

***Parotia carolae* (Meyer)**

Queen Carola's Parotia. Length 9⅓ in. Adult male: upperparts velvety to bronzy black, except for crown which has an iridescent green-blue patch on hind crown and midline of central and forecrown brownish gold edged with elongated glossy white-tipped feathers (the gold-tipped feathers when folded backward into the top of the dish-shaped skull are largely concealed by the white-tipped feathers which close over them from the sides; when erected the gold-tipped plumes form a crest which hangs over the bill like the forward end of a Roman helmet); sides of forecrown dark brown or black; eye-ring gold to brown; lower sides of head pale buffy to blackish brown; above ear-coverts a short tuft of hair-like plumes from which spring three greatly elongated wire-like shafts (up to 120 mm), each of which is tipped with a black oval feather racket; throat and malar region dull golden buff to blackish; lower throat sometimes whitish with chestnut tipping; upper breast with a broad iridescent shield that is violet and lilac tinged with pale green and gold; rest of underparts brownish black slightly glossy, except for elongated flank plumes 100 mm long which are partly white and chestnut-brown; iris greenish yellow with a tan inner edge; bill and feet black; inside of mouth greenish yellow; wing 155 mm, tail 78 mm, exposed culmen 19 mm, tarsus 53 mm. Females: upperparts, including crown, brown; side of head brown with a broad irregular greyish

superciliary line extending from lores to nape; another line greyish with brown flecks below eye; underparts pale ochraceous with narrow dark barring; outer edges and inner halves of remiges chestnut ochraceous; under wing-coverts ochraceous with dark barring; iris pale blue; inside of mouth lemon-yellow; wing 131 mm, tail 82 mm.

RANGE Central New Guinea from Weyland to Sepik Mountains, from 4,000 to 6,000 ft.

SUBSPECIES Six rather well marked races:

a) *carolae* (Meyer); Weyland Mountains; upperparts blackish; chin and sides of throat buffy; eye-ring coppery; long loral feathering black with white tips.
b) *meeki* (Rothschild); Snow Mountains; like *carolae* but chin and sides of throat blackish brown not buffy.
c) *chalcothorax* (Stresemann); known only from Mt Doormanpaad, upper Mamberamo (Idenburg) River; like *carolae* but upperparts brownish with a coppery sheen.
d) *berlepschi* (Kleinschmidt); origin unknown, possibly the van Rees Mountains on Mamberamo River; like *carolae* but upperparts heavily bronzed, no eye-ring, and with a black throat.
e) *clelandiae* (Gilliard); Victor Emanuel and Hindenburg Mountains of Sepik headwaters; like *carolae* but wing and occipital wires longer and upperparts generally darker, more jet-black, less brownish black.
f) *chrysenia* (Stresemann); Sepik Mountains (Lordberg and Hunsteinspitze); like *carolae* but differing from all by having the long loral feathering copper-coloured like eye-ring not black as in all other races.

DISPLAY The dancing grounds are similar to those of the Arfak six-wire, but the cleared areas are six to eight feet in diameter, and the ground about may be spattered with droppings containing red and yellow seeds which are so plentiful as to be conspicuous.

REMARKS This species seems to be very local in occurrence, and scarce. It appears to have a constantly changing facial expression. This seems to be due to the fact that the skull above is shaped like a shallow dish, thus making it possible for the male to retract and largely hide the brilliant golden crest. However, when the male is sitting still it often partially lifts and pulsates the crest and at the same time moves its retractable chin and throat 'whiskers'. Ornaments which are also in motion, but which are not exactly a part of the 'expression' are the flag-tipped wires which thrash about in a most incongruous manner whenever the male moves its head.

***Parotia lawesi* (Ramsay)**

Lawes's Six-wired Parotia. Length 10¼ in. Adult male: upperparts velvety black, except for iridescent purple-blue patch on nape and the crest on forehead which is glossy blackish brown edged at base of bill with golden-brown or white; above ear-coverts a tuft of hair-like plumes from which spring three greatly elongated wire-like shafts (up to 162 mm long) each tipped with a black oval feather racket; sides of head, neck and throat brownish black; upper breast with a broad iridescent shield bronze-green tinged with traces of blue; remaining underparts, including wing linings, black and slightly glossy; flank tufts 110 mm long; iris yellow; bill black; feet black; wing 153 mm, tail 79 mm, exposed culmen 17 mm, tarsus 52 mm. Female: upperparts dark reddish brown with top and sides of head and neck blackish; throat and lower sides of head buffy with fine bars and tips; rest of underparts deep ochraceous brown with narrow dark bars; under wing-coverts ochraceous; wing 142 mm, tail 91 mm.

RANGE Mid-mountains of south-eastern New Guinea from 3,200 to 4,500 ft.

SUBSPECIES Three well marked ones:

a) *fuscior* (Greenway); Herzog Mountains; male with white in forehead.
b) *lawesi* (Ramsay); southern slopes of mountains of south-eastern New Guinea; like *fuscior* but female brighter brown on back.
c) *helenae* (De Vis); northern slopes of mountains of south-eastern New Guinea; like *fuscior* but with no white in forehead.

NESTING AND DISPLAY The nest is a shallow cup of wire-like stems of a climbing plant and lined with finer stalks of the same and some rootlets [in fork of a branch in a tree?] (Hartert, 1910). A single vinaceous red egg with dark rufous to almost black patches and spots and some greyish spots; size 33 × 24 mm.

This species displays on a dancing ground which is much like that of *P. selfilata*, as is the dance. One dance given in captivity is described as: the male draws itself erect, raises the long velvety back feathers, fan-wise, at right angles to back and similarly erects feathers of lower breast and abdomen to complete the circle into the 'umbrella' pose. The dance consists of slow, short hops, two feet to the right, two feet to the left, and back again. The head moves rapidly from side to side with a rhythmical motion, causing the racket-tips of head plumes to bob madly. Finally the body is bent forward to the horizontal, and the head motion increases in speed until the racket-tips are a blur, and then the dance is over.

REMARKS Locally this is a common, solitary species found in the upper part of the forest where it feeds on fruit.

***Parotia wahnesi* (Rothschild)**

Wahnes's Six-wired Parotia. Length 15½ in. Adult male: upperparts black with a small iridescent violet-blue patch on nape and an erectile tuft of brownish-gold-tipped feathers on forehead; above ear-coverts a tuft of short hair-like plumes from which spring three greatly elongated wire-like shafts (up to 141 mm long) each tipped with a black oval feather racket; throat, sides of head and sides of neck purplish black; lower throat and upper breast with a broad iridescent golden copper to golden green shield; remaining underparts, including the long flank plumes (up to 110 mm), black and somewhat glossy; wing 159 mm, tail 215 mm, exposed culmen 18 mm, tarsus 52 mm. Female: upperparts chestnut-brown; foreback with black bars, and top, sides of head and sides of neck black; a vivid white post-ocular stripe; sides of lower head and throat grey with narrow dark barring; a blackish streak at sides of throat; rest of underparts a dark ochraceous brown with narrow dark bars; wings (including coverts) and tail mostly ochraceous brown; wing 146 mm, tail 164 mm.

RANGE Mountain forests of Huon Peninsula, from 3,800 to 5,500 ft.

DISPLAY The main display of this species seems to be of the 'umbrella' type common to the genus, but in a preliminary display the long tail is used. The bird stands on the ground, body horizontal, wings folded high, above the long flank feathers, and the tail is turned sideways. The bird feigns pecking at the ground, then throws the body forward and downward with head turned under the breast, crown parallel with the ground. Now the tail is pointed straight up and the lateral tail feathers are rapidly opened and closed, fan-like. After five or six fanning movements, the tail is dropped and the umbrella pose adopted, body upright, long feathers of back and rump raised to form the umbrella, the head plumes thrown forward, and the iridescent breast plates flattened and noticeable. The head, stretched up, is turned, causing the rackets to 'dance'. Then the bird takes short steps, then stands still except for moving, 'wobbling', the neck from side to side, and the display ends. The tail takes no part in this later display. Though the bird usually displays on the ground, the umbrella display is sometimes given from a perch. (Crandall.)

***Lophorina superba* (Pennant)**

Superb Bird of Paradise. Length 9½ in. Adult male: a black bird with patches of iridescence, an elongated cape on hind neck and shield on forebreast; bill about as long as head and tail shorter than wing;

upperparts black except for crown which is iridescent blue-green; violet gloss on central tail feathers and bronzy gloss on dorsal cape which has lateral plumes up to 130 mm long; underparts and side of head black, glossed with bronze on throat, and with an iridescent green pectoral shield with outer corners up to 80 mm long; iris blackish; bill black; feet black; inside of mouth lime-yellow; wing 141 mm, tail 89 mm, bill from base 25 mm, tarsus 33 mm. Female: without ornamental plumes; upperparts greyish brown; crown dark brown with fine whitish flecks; an irregular whitish streak from lores over eye to side of head and nape; a broad dark brown streak through the eye; wings and tail dull brown, the former with broad chestnut edges; underparts greyish tinged with buff and with narrow blackish brown bars; wing linings ochraceous buff with narrow dark bars on under wing-coverts; iris dark brown; bill black; feet black; wing 114 mm, tail 79 mm, bill from base 28 mm, tarsus 29 mm.

RANGE Mid-mountain forests and forest edges virtually throughout New Guinea, from 3,200 to 7,250 ft.

SUBSPECIES Eight fairly similar ones, mostly distinguished by the female:

a) *superba* (Pennant); Vogelkop.
b) *niedda* (Mayr); Wandammen district.
c) *feminina* (Ogilvie-Grant); New Guinea from Weyland and Snow Mountains to Hindenburg, Victor Emanuel, Giluwe, Hagen, Kubor, and Bismarck Mountains.
d) *pseudoparotia* (Stresemann); Hunstein Mountains, middle Sepik River valley.
e) *latipennis* (Rothschild); mountains of Huon Peninsula.
f) *connectens* (Mayr); Herzog Mountains.
g) *minor* (Ramsay); mountains of south-eastern New Guinea.
h) *sphinx* (Neumann); from an unknown locality, perhaps in the extreme south-east of New Guinea.

NESTING AND DISPLAY The nest is evidently a shallow cup placed in the fork of a tree, made of twigs, rootlets and dry and partly decayed leaves; eggs two, brownish buff to cream colour, with spots, dots, and longitudinal markings of brown, rufous and secondary greys.

The display takes place in trees, apparently on larger, moderately sloping outer branches of the lower part of the canopy trees. Here the male, alone, persistently utters loud harsh calls. The display recorded in captivity is as follows: the male crouches low on his perch, partly spreading his wings and expanding his breast plate to the utmost, while the cape is erected so that it stands about the head like an enormous ruff, the long lateral feathers almost meeting in front. He then dances clumsily, at intervals giving a series of thin, harsh screams, with mouth wide open showing the bright yellow lining. (Crandall.)

REMARKS The superb bird of paradise is generally a common bird. Females are commonly observed feeding on fruit in the middle and upper branches of trees on the forest edge and in second growth. Adult males are less often seen and tend to keep higher in the forest trees. In addition to fruit, some insects are eaten.

***Craspedophora magnifica* (Vieillot)**

Magnificent Rifle Bird. Length 13½ in. Adult male: a black bird with patches of iridescence; bill longer than head, and slightly curved; tail shorter than wing, and flank tufts ending in hair-like projections; upperparts and sides of head velvety black with rich violet-purple reflections; except for crown and nape which are iridescent steel blue-green; and wings and tail with dull glossy purplish blue-black, and the central pair of tail feathers iridescent bluish green; central throat to upper breast iridescent blue-green (the feathers of the lower neck forming an erectile fan); a narrow pectoral band bronze-green to ruby-red; remaining underparts blackish suffused with pinkish purple except abdomen and outer halves of flank plumes dead black; iris brown; bill and feet black; inside of mouth pale greenish yellow; wing 189 mm, tail 104 mm, bill from base 57 mm, tarsus 42 mm. Female: upperparts cinnamon-brown; a narrow whitish, black-flecked streak over eye; a band through eye from lores to sides of head dusky brown; lower cheeks white with a scale-like texture; a narrow submalar streak dark brown; throat whitish with fine brown markings; remaining underparts, including under wing-coverts dull white with profuse blackish brown barring; under wing and tail largely cinnamon-chestnut; iris dark grey-brown; bill black; feet dark grey; inside of mouth pale greenish yellow; wing 152 mm, tail 103 mm, bill from base 51 mm, tarsus 37 mm.

RANGE Forests of New Guinea and the Cape York Peninsula, northern Australia, from about 200 to 4,500 ft.

SUBSPECIES IN NEW GUINEA Two similar ones:

a) *magnifica* (Vieillot); western New Guinea, east in north to Sepik River and in the south to Fly River; lower breast and abdomen suffused with dark pinkish purple.
b) *intercedens* (Sharpe); eastern New Guinea, west in the north to Astrolabe Bay and in the south to Hall Sound; like *magnifica* but lower breast and abdomen with more pinkish purple gloss.

NESTING AND DISPLAY The nest is a deep cup, apparently in a tree, described as made of thin wire-like fibres with the outside surrounded by large dry leaves. Eggs two, cream-coloured, longitudinally streaked with brown and secondary grey; size 34 × 23·5 mm.

The display is given high up in a tree, apparently the sole property of a single male, and in a position difficult to see from the ground. In the display recorded in captivity, the male, on a perch, spreads the wings sideways to their fullest extent, undersurface forward, and the neck extended upward. The head and neck are then moved from one side to the other, first slowly, then quickly, the glittering throat shield moving back and forth, rhythmically, flanked by the black wings. In some forms of this display, the head moves at a different, slower rate, and the body is moved up and down by bending and straightening the legs, and the wings are moved with a rustling sound.

REMARKS Though the rifle bird is fairly common and conspicuous because of its loud, oft-repeated call, it is often very hard to see. It is shy, and even when close at hand may be concealed in the treetops. When the male flies the heavy silken rustling of its wings is very noticeable. These birds are confirmed fruit eaters, but many insects are also eaten, as is the case with many other birds of this family.

**Seleucides melanoleuca (Daudin)**
also known as *Seleucides ignotus*

Twelve-wired Bird of Paradise. Length 13¾ in. Adult male: a black and yellow bird with iridescent areas; bill longer than head and slightly curved; tail shorter than wing, and flank tufts reaching beyond end of tail, from which 'wires' bend back and reach as far as breast. In detail: crown and nape covered with short feathers which are black with a purplish gloss; back and rump black with a bronze gloss; wings and tail black, the feathers edged with pink-purple iridescence; side of head black with a naked area behind eye; throat and breast black glossed with green, the feathers of the lower breast elongated and tipped with iridescent green giving a black, green-edged pectoral shield; abdomen, flanks and under tail-coverts lemon-yellow (fading to white in museum specimens); flank tufts yellow, 150 mm long and six of which on each side end in black, wire-like shafts (up to 295 mm long), which immediately curve to point outward or forward; iris vermilion; bill black; feet flesh-yellow; inside of mouth aqua-green; bare area behind eye black; wing 162–74 mm, tail 70 mm, culmen from base 67 mm. Female: top of head to below eye, and body and uppersides of neck black with a faint tinge of purple; rest of upperparts chestnut; naked space behind eye; lower sides of face and throat greyish, finely mottled with dusky bars; remaining underparts buffy tinged with rufous posteriorly, with narrow dark barring, under wing rich ochraceous with chestnut bars on under wing-coverts; iris orange; bare area behind eye black; bill black; feet yellowish flesh; wing 162 mm, tail 108 mm.

RANGE Salawati and New Guinea exclusive of the northern watershed of south-eastern New Guinea and the Markham River.

SUBSPECIES Two very similar ones:

a) *melanoleuca* (Daudin); Salawati and all New Guinea except the north coast.

b) *auripennis* (Schluter); northern New Guinea from the Mamberamo River to Astrolabe Bay and the Ramu River; like *melanoleuca* but wing shorter.

NESTING AND DISPLAY The nest is a shallow basin of pandanus bark stripping and vines placed on a few sticks and leaves and lined with rootlets and plant fibres placed in a tree or pandanus. A single cream-coloured egg with longitudinal rufous and greyish streaks chiefly about the larger end; size 40·7 × 26·5 mm. A female seen building was working alone, and was very shy. No male was in attendance, nor anywhere in the vicinity.

The displays recorded for this species hardly do justice to the variety of poses and actions that a single male showed one afternoon in the Bronx Zoo. The usual arrangement of the plumes was for the flank tufts to be closely pressed to the body with the wires standing out at right angles, while the breast shield was extended and raised. The bird's pose was horizontal and parallel with its perch. Then it hopped along the level part of the perch, then along the upright part of the perch, head pointed upward, then around the upright perch with body horizontal and more or less curved around the upright, then, head downward, back to the horizontal perch where it adopted an upright pose, then moved its feet so that it was hanging straight down below the perch, it then moved back to the upper side of the perch. Several times while hopping along the perch, the body was vibrated rapidly while the bird gave little thin calls. Another time the bird, hopping along the perch, raised and spread its wings showing their purplish iridescence to perfection, and called a rather loud, clear 'caw', raising and lowering its wings with each call. At no time did the bird spread the flank tufts which are probably used in another type of display.

REMARKS The twelve-wire may be common locally in its favourite swamp-forest habitat, more often it seems to be scarce. However, its loud, conspicuous calls may announce its presence. It is usually recorded as solitary, living low in the forest, but males have been recorded in small parties in the tops of trees. This species has been recorded as probing into flowers of trees, notably palms, presumably for nectar, but it also eats fruits and insects. As with some other birds of paradise, it may hold food under one foot while breaking off pieces to swallow. The male may take as much as seven years to acquire its full plumage, and in the Bronx Zoo, one lived for more than twenty years.

**Key to *Diphyllodes* Species**

Crown with large naked areas: *D. respublica.*
Crown without large naked areas: *D. magnificus.*

***Diphyllodes magnificus* (Pennant)**

Magnificent Bird of Paradise. Length 7¾ in., without central tail feathers. Adult male: a green-black, yellow, orange, red and brown bird with cape on hind neck and short tail except for elongated, very narrow, coiled, central tail feathers. In detail: crown and nape with short, brown feathers; hind neck with a cape-like fan of glossy, pale yellow feathers (35 mm long), with square tips; foreback glossy, dark red, margined posteriorly with a narrow, black band; lower back and rump orange or orange-red; lesser wing-coverts brown, greater wing-coverts and inner secondaries glossy orange-ochraceous or yellow; primaries blackish, inner ones narrowly edged yellow; upper tail-coverts and short (1½ in.) tail feathers black; central tail feathers (12 in. long) very narrow (⅛ in.) and iridescent green-purple and loosely curled into a nearly complete circle; chin black; side of neck with tuft (2 in.) of brown feathers; throat and breast with glossy deep green, somewhat lengthened feathers with an iridescent band of blue-green down midline of throat; abdomen and under tail-coverts black; iris brown; bill blue with black cutting edge; feet blue-black; naked skin behind eye pale blue; inside of mouth bright yellow-green; wing 114 mm, tail (without central rectrices) 40 mm, central rectrices 300 mm, culmen 21 mm, tarsus 32 mm. Female: upperparts dull olive-brown, somewhat darker on head, particularly around eyes; wing and tail dark brown becoming more dull olive externally; undersurfaces of body grey washed with buffy or pale brown and regularly and finely barred with black; iris dark brown; bill pale blue-grey; feet bright violet-blue; bare skin on face pale blue; inside of mouth jade-green; wing 110 mm, tail 63 mm.

RANGE Misol, Salawati, and Japen Islands, and all of New Guinea from 1,900 ft to about 5,000 ft.

SUBSPECIES Four similar ones:

a) *magnificus* (Pennant); western islands and extreme western New Guinea (Misol Island, Salawati Island, Vogelkop, Wandammen district and Onin Peninsula); scapulars and inner secondaries clay-coloured.
b) *intermedius* (Hartert); southern slopes of Weyland, Nassau, and Oranje Mountains; like *magnificus* but scapulars and inner secondaries somewhat brighter, more dull orange.
c) *chrysopterus* (Elliot); Japen Island and north New Guinea from south of eastern Geelvink Bay to mountains of the Sepik River; like

*magnificus* but scapulars and inner secondaries bright golden orange.

d) *hunsteini* (Meyer); eastern New Guinea west to Huon Peninsula, Central Highlands and the upper Fly River; like *magnificus* but generally lighter on crown, body and wings.

NESTING AND DISPLAY Egg yellowish cream with light brown and grey longitudinal marks (similar to the egg of *Paradisaea minor*); size 32 × 23 mm.

The male clears a space for a display area and maintains it as his sole property for months (perhaps year after year). Here the female comes to mate, and later presumably carries on the nest duties alone.

The display area is made in a patch of second growth in the forest such as where a tree has fallen, and saplings grown up. The area is more or less a circular space on the ground and about fifteen to twenty feet in diameter. From this all leaves, twigs and small plants are cleared by the male, leaving the ground moss covered. Numbers of saplings, mostly dead, stand in the area, and leaves and twigs have been plucked from the living ones. Probably the dead saplings had been killed in this way by the bird. The result is that light reaches the ground unimpeded. The male spends much of the day perched near the display area, frequently giving his loud call, or else he is in the display ground, cleaning it.

All displays are given while the bird is perched on the vertical saplings. Occasionally the male, alone, displays by pulsing its somewhat spread breast shield, or by stretching out in a horizontal display. On one occasion, mating was observed. A female came into the display area and perched on a perpendicular sapling above the male. The male, also on the vertical sapling, displayed by spreading and pulsing his breast shield towards her, and giving low calls. The birds moved about, with the display repeated. Finally, when the male was about a foot above the ground and the female a foot above him, the male gave a horizontal display. Holding on to the vertical perch with his feet he straightened out horizontally, breast turned up towards the female, green breast shield flattened and spread, yellow cape spread straight out back of the head. While he held this pose, the female hopped down the sapling to him, he abandoned the pose, mounted her and copulation ensued. The male then dismounted, and gave another display: with tail erect at right angles to the back he vigorously pecked her nape, between each peck drawing back and holding his mouth wide open, showing its yellow-green mouth lining. In a few moments the female flew away.

A stuffed male, placed in the display ground, was attacked by the resident male.

REMARKS The 'magnificent' is a common species, but its loud calls are more conspicuous than the birds are themselves. Females are more

often seen than are the full-plumaged males. They are sometimes seen in the top of a fruiting tree, feeding in company with pigeons and cuckoo shrikes; sometimes moving about lower among the branches and along the lianas, apparently searching and probing for insects. From stomach examinations it seems that the major part of the diet is fruit.

***Diphyllodes respublica* (Bonaparte)**

Waigeu Bird of Paradise. Length 6–7 in. Adult male: a dark green, black, yellow, and red bird with bare areas on hind crown and narrow, curved central tail feathers projecting $\frac{3}{4}$ in. beyond rest of tail. In detail: forecrown velvety black; hind crown with naked blue skin and one line of black feathers making an oval, and another a straight median line through it; nape black followed by a short ($\frac{1}{2}$ in.) fan of shiny, pale yellow feathers; back glossy red, margined with black on sides and posteriorly; rump blackish washed red; wing black with inner secondaries partly red; tail black, central pair of feathers narrow ($\frac{1}{8}$ in.), curved, and projecting about $\frac{1}{2}$ in. beyond rest; side of head and neck and upper throat black; lower throat and upper breast with a shield of glossy green feathers (purple-red in some lights), a few on throat with iridescent blue spots; rest of underparts brownish black with a purple gloss; iris brown; bill black; feet blue; naked skin of head blue; wing 98 mm, tail (without central feathers) 38 mm, central tail feathers 60 mm, culmen 28 mm, tarsus 28 mm. Female: without ornamental plumes; forecrown brownish black, hind crown as in male but lines of feathers brown; rest of upperparts brown, the inner wing quills margined orange-brown; underparts buffy ochraceous with narrow, buffy brown bars; wing 92 mm, tail 54 mm, culmen 21 mm, tarsus 25 mm.

RANGE Waigeu and Batanta Islands.

DISPLAY The display area is much like that of the related 'magnificent': a cleared area on the ground in which a number of vertical saplings stand, and presumably it is on these vertical perches that the displays are given. A single male was found in possession of a dance area. The displays recorded in captivity were apparently given on horizontal perches; perhaps because no vertical ones were available. Four types of display have been recorded in the London Zoo: (a) the bird stretches stiffly upwards, jerks its head from side to side giving low, whistling notes; (b) the notes become louder, the jerking of the head ceases, and the beak is opened and closed several times showing the vivid green lining of the mouth; (c) suddenly the bird retracts its head, elevates and expands its breast shield with upper margin extending up each side of head of which the blue hind crown is just visible, after holding this pose for a few moments the bird changes back to pose (a); (d) the bird moves

its body parallel to the perch and depresses its head which is slowly moved from side to side. The yellow neck cape was not usually used in these displays. Other types of display, involving the ruff and the use of vertical perches, may be expected.

A mirror was placed in the bird's cage and the male violently attacked its image, lending weight to the supposition that these birds defend their display areas.

REMARKS This is apparently a common species in the forests of the two western Papuan islands which comprise its range.

***Cicinnurus regius* (Linnaeus)**

King Bird of Paradise. Length 6¼ in. Adult male: upperparts glossy crimson with a pearly lustre in some lights; becoming more orange on forehead and tail; a spot or slash over eye glossy green but usually appearing black; central pair of rectrices greatly elongated and wire-like (up to 150 mm long), tipped with disk-like feather spirals of iridescent emerald-green; sides of head, neck and chin like back; throat and upper breast deep purplish crimson edged posteriorly with buff followed by a glossy oil-green pectoral band; at side of upper breast an ash-coloured erectile fan (up to 45 mm long) tipped broadly with emerald-green and with subterminal narrow grey and brown bands; remaining underparts, including under wing-coverts, white; iris brown; bill yellow; feet blue; wing 97 mm; tail (without central plumes) 34 mm, culmen 19 mm, tarsus 28 mm. Female: upperparts uniform brown tinged with olive on head and with greater coverts and wing quills darker brown edged externally with chestnut; sides of head brown with fine, pale streaking; underparts buffy (to dull ochraceous on throat and upper breast), narrowly barred with dark brown; inner edges of wings ochraceous; wing 98 mm, tail 60 mm.

RANGE Aru Islands, islands of western New Guinea (Misol, Salawati, Batanta), Japen Island (Geelvink Bay) and all New Guinea; lowlands up to 2,500 ft.

SUBSPECIES Six rather similar ones:

a) *regius* (Linnaeus); Aru Islands.
b) *rex* (Scopoli); western Papuan Islands (Misol, Salawati, Batanta) and all New Guinea except the north between Geelvink Bay and Huon Gulf.
c) *gymnorhynchus* (Stresemann); north-west coast of Huon Gulf.
d) *similis* (Stresemann); Astrolabe Bay and upper Ramu River west at least to Humboldt Bay and upper Mamberamo basin.
e) *cryptorhynchus* (Stresemann); east coast Geelvink Bay and north New Guinea near mouth of Mamberamo River.
f) *coccineifrons* (Rothschild); Japen Island.

NESTING AND DISPLAY This occurs in a natural hole in a small tree low in the forest, a nest being made in the cavity; eggs two, creamy white with dark brown streaks on larger end; size 27·5 × 21 mm.

Incubation twelve days by female only; young leave nest at fourteen days (normal?); the female feeds the young by regurgitation and performs nest sanitation.

The male displays on the upper branches of a medium-sized densely-leafed, shrubby forest tree which is his private display area. Most of the daytime is spent in this tree for weeks, perhaps months. Here, on a shady perch he sits quietly, but frequently calling a hard 'caaar', and occasionally hopping or flitting about. Occasionally, he displays alone. In captivity, one sequence of displays to a female is as follows: the tail is raised at right angles to the back, then the wings spread somewhat downward and forward. Then the wings are vibrated and soon spread to their full length. Suddenly the bird hangs upside down from the perch with wings still spread and vibrating. The mouth is open, showing the yellow-green gape. After a minute or so, the wings are closed and still hanging the body is swung from left to right for a few seconds. Then the male drops and flies to a perch. No mating was seen to follow.

The more usual display, given either facing or with the back towards the female, perched on a branch, is for the male to sing a warbling song as it displays, then expand the pectoral fans and draw them up towards his head, at the same time puffing out the white feathers of the underside so as to become almost spherical, sweeping his tail wires up over his back so their rackets are above his head. The head is raised and constantly swayed slightly from side to side. Sometimes the tail wires are swayed. (See *Aviculture Magazine* (1957), *63*, 115 ff., for breeding in captivity.)

Other poses are adopted, including hanging under a branch with the wings closed, and perched on a branch with pectoral tufts spread sideways and white abdomen feathers fluffed out so as to cover feet and perch while the body is stiffly upright. It has been suggested that an aerial display is also given, the bird flying up above the forest trees.

REMARKS The 'King' bird is fairly common in the lowland forests, where its loud calls are commonly heard from the trees. Its diet seems to be largely fruit.

**Key to *Paradisaea* Species (Adults)**

1 With ornamental plumes on sides of breast (males): 2.
Without ornamental plumes (females): 7.

2 Ornamental plumes mostly red or orange: 3.
Ornamental plumes mostly white and yellow: 5.
Ornamental plumes mostly blue: *P. rudolphi*.

3 Central tail feathers long and wire-like: 4.
Central tail feathers long and strap-like: *P. rubra.*
4 Breast blackish brown to maroon: *P. raggiana.*
Breast grey: *P. decora.*
5 Back maroon: *P. apoda.*
Back partly yellow: 6.
6 Crown all yellow: *P. minor.*
Most of crown iridescent green: *P. guilielmi.*
7 Bright blue in wings: *P. rudolphi.*
No blue in wings: 8.
8 Breast and abdomen white: *P. minor.*
Breast and abdomen not white: 9.
9 No yellow in nape or hind neck: *P. apoda.*
Some yellow in nape and hind neck at least: 10.
10 Broad yellow band across lower throat (Waigeu): *P. rubra.*
A narrow incomplete yellow band across breast (Huon Peninsula): *P. guilielmi.*
Not so: 11.
11 Breast barred (D'Entrecasteaux Archipelago): *P. decora.*
Breast not barred: *P. raggiana.*

***Paradisaea apoda* (Linnaeus)**

Greater Bird of Paradise. Length (without tail wires) 18 in. Adult male: back, wings and tail maroon-brown; crown and hind neck pale yellow; forehead and chin black with green reflections; throat and foreneck iridescent green; upper breast deep purplish brown, lower breast and abdomen maroon-brown; ornamental tufts on each side of upper breast up to 550 mm long, feathers with lax, lacy structures except at base, and pale yellow (a few streaked with brown near base), paler and tinged maroon towards tips; the central tail feathers are modified to straight wire-like structures and up to 770 mm long; iris yellow; bill grey-blue whitish at tip; feet flesh-colour; wing 224 mm, tail 164 mm, exposed culmen 36 mm, tarsus 57 mm. Female: generally maroon-brown, darker on head and neck, paler on breast and abdomen; wing 187 mm.

RANGE Aru Islands and south New Guinea; lowlands.

SUBSPECIES Two similar ones:
a) *apoda* (Linnaeus); Aru Islands.
b) *novaeguineae* (D'Albertis and Salvadori); south New Guinea (Mimika River to Dutch-Papuan border and east inland to middle Fly River where hybridization with *P. raggiana* occurs).

NESTING AND DISPLAY The nest is apparently not described but native collectors say two eggs are laid (presumably in a basin-shaped nest in a

tree); egg brownish buff with red-brown and blackish brown streaks, more plentiful about larger end; size 35 × 25 mm.

A number of males, sometimes as many as twenty, gather to display in the crown of some tall forest tree. During the display, the wings are held out to the sides, the back is arched, the tail is bent forward under the perch, and as the wings are flapped the long, ornamental plumes are raised between the wings and body so that they point nearly straight up, with the tip cascading down, virtually concealing the back and overhanging the head. The head is held low, even below the perch. Thus posturing the bird stands as if frozen, or only slightly quivering for many seconds. Then it may make short hops along the branch, and may give harsh, crow-like cries. Such actions and calls may be synchronized by a number of males. Young males may actively move about the outskirts of the displaying ground. Apparently each male does not always display on the same branch.

When a female approaches the males 'freeze' in the displaying attitude, the display plumes up and mouth open, as the female moves among them to select a mate.

REMARKS This is an active bird found in the forest treetops. It is very abundant, small flocks of females and young males are constantly seen; and although the full plumaged birds are less plentiful, their loud cries which are heard daily show they also are very numerous. Their note is 'wauk-wauk-wauk-wok-wok-wok' and is so loud and shrill as to be heard at a great distance, and to form the most prominent and characteristic animal sound in the Aru Islands (Wallace).

This is the original 'bird of paradise' and in its scientific name is a relic of the early belief that these birds were footless, turned always to the sun and never came to earth until they died, as they had neither feet nor wings (they were first known from incomplete trade skins).

Between 1909 and 1912 this species was introduced into the island of Little Tobago in the West Indies where there is now a thriving, small colony (perhaps only a few dozen individuals) which is advertised as a tourist attraction.

**Paradisaea raggiana (Sclater)**

Raggiana Bird of Paradise. Length 13–14 in. (without tail 'wires'). Adult male: forehead black glossed green; crown and hind neck pale yellow; back and rump deep maroon (varying in subspecies from slightly to heavily washed with yellow or mostly yellow); upper wing-coverts maroon (with or without an olive yellowish wash, subspecies) with a yellow bar on middle wing-coverts; wing and tail quills maroon; lores and chin black with a greenish gloss; throat and foreneck iridescent green followed by a yellow band (narrow or absent in one subspecies)

which joins yellow of hind neck; upper breast purplish black; lower breast and abdomen vinaceous maroon, with an enormous ornamental tuft of feathers (up to 520 mm long) on each side of breast, these feathers lace-like on distal half and red in colour, paler and tinged with grey and cinnamon towards tip (more apricot-orange in one subspecies); central tail feathers enormously elongated (up to 450 mm) as straight, wire-like structures; iris yellow; bill grey; feet red-brown; wing 192 mm, tail 140 mm, exposed culmen 31 mm, tarsus 46 mm. Female: forehead blackish brown; crown and hind neck washed with pale yellow; rest of upperparts dark maroon (subspecies olive-brown more or less washed with yellow); throat and breast dark maroon-brown; rest of underparts pale vinaceous maroon; wing 163 mm.

RANGE South central and eastern New Guinea; lowlands to 5,700 ft, common in foothills.

SUBSPECIES Five well marked races:

a) *salvadorii* (Mayr and Rand); south New Guinea (from Oriomo and Fly Rivers, where it hybridizes with *P. apoda*, north to the Wahgi Valley, where it hybridizes with *P. minor*, and east to Port Moresby and the Cloudy Bay region); back in male and female maroon-brown; flank plumes scarlet; a broad yellow throat collar.

b) *raggiana* (Sclater); extreme south-eastern New Guinea; like *salvadorii* but upper half of back in male golden yellow; flank plumes deep scarlet.

c) *intermedia* (De Vis); north watershed of south-east New Guinea (from Collingwood Bay west to Holnicote Bay, Kumusi River, and lower Mambare River); like *salvadorii* but male and female with the back straw-yellow, flank plumes scarlet.

d) *granti* (North); range not known exactly, but somewhere in south-east New Guinea between Mambare River and Salamaua; like *salvadorii* but male and female with the back straw-yellow; flank plumes reddish orange.

e) *augustaevictoriae* (Cabanis); coasts of Huon Gulf and Markham River valley west to the Uria River in the headwaters of the Ramu River (where it hybridizes with *P. minor*); like *salvadorii* but male and female with the back straw-yellow; flank plumes rich apricot-orange; throat collar very narrow or absent.

NESTING AND DISPLAY The nest is basin-shaped, made of vines and dead leaves lined with plant fibres and placed fourteen to thirty-five feet up in a fork of a tree; a single pinkish cream egg, with red-brown longitudinal streaks more plentiful on larger end, and some smaller spots on rest of egg; size 38 × 25 mm.

At one nest the female alone was seen and she showed great agitation at human intrusion.

A group of males, three to eight in number, gather in a group of trees, and each bird establishes an area, perhaps 20 to 100 ft apart as an exclusive display area. Each display area consists of several leafless, slender, sloping branches which usually command a fairly open view of the surrounding country and are exposed to the morning sun. The males spend much time on the display branches, calling, preening, stropping the bill on the branches, moving about and sitting still.

In display the body is horizontal, the head lowered, the wings raised and the bends of the wings ('wrists') are brought together with thumps audible at some distance, while the breast plumes are brought upward and backward in a curving spray and the whole body vibrates. When immature or female birds (indistinguishable in the field), or other plumaged adult males from adjacent display areas approach an individual's display area, the owner prances some five or six feet along the branches, displaying. There is much acrobatic dancing and on one occasion a displaying male swung to the underside of a branch while a female-plumaged bird hopped along the top of the perch. However, actual mating was not seen. On one occasion an immature male (or a female?) went through the form of the display, though without the ornamental plumes.

REMARKS Raggiana bird of paradise is a common bird in the forest treetops; its loud harsh calls are often heard, and the species comes to fruiting trees to feed.

The species remain common even in areas where they are hunted for plumes; perhaps due to the polygamous nature of mating, and perhaps by younger male birds being able to mate some years before they attain their full plumage. In the Central Highlands display areas were often in a grove of trees surrounded by grasslands or native gardens. The birds did not retreat before agriculture and were not disturbed by human population pressure. One nest was seen in (near?) the Lae Botanical Gardens.

Though the greater and the raggiana bird of paradise are sometimes considered one species, we think that each is entitled to specific rank because of

a) the sharp difference in plumage characters;
b) where the two meet they hybridize rather than intergrade;
c) the difference in the display itself, notably in the use of the wings;
d) the difference in the ownership of the display areas.

***Paradisaea minor* (Shaw)**

Lesser Bird of Paradise. Length 13 in. (without tail 'wires'). Adult male: forehead black with a green gloss; crown and hind neck yellow; foreback dull yellow, changing to maroon on lower back and tail; wings

maroon, the greater upper-coverts with narrow yellow tips giving a narrow bar; chin black with green gloss; throat and foreneck iridescent green; rest of underparts maroon-brown except for ornamental tufts on each side of breast which may reach 430 to 560 mm long. This tuft is golden yellow at base and white lightly tinged lavender towards tip and on inner plumes; on outer edge of tuft there are a few short yellow plumes with blood-red streaks. The central tail feathers are prolonged (up to 490 mm) as wire-like structures; iris yellow; bill blue-grey; feet blue-grey; inside of mouth pale green; wing 177 to 186 mm, tail 127 mm (with central tail 'wires' to 490 mm), exposed culmen 33 mm, tarsus 45 mm. Female: crown dark brown; rest of upperparts dull maroon, heavily washed with yellow on hind neck, less so on foreback, and upper wing-coverts edged with dull yellow; sides of head and throat dark brown like crown; breast to under tail-coverts white, thighs washed with maroon; wing 161 mm.

RANGE Northern and western New Guinea including Japen Island in Geelvink Bay, and Misol Island in the western Papuan Islands; from sea level to 5,700 ft.

SUBSPECIES Four similar ones:

a) *finschi* (Meyer); Finsch Coast (Aitape region) and Sepik Valley (to Telefomin), east to Astrolabe Bay (north watershed of the Finisterre Mountains), Huon Peninsula, and upper Ramu River (where it hybridizes with *P. raggiana*); flank plumes bright orange-yellow, reaching 450 mm in length.

b) *jobiensis* (Rothschild); Japen Island; like *finschi* but flank plumes a paler, golden yellow, and much longer (up to 560 mm).

c) *minor* (Shaw); west New Guinea, east in the north to Humboldt Bay and east in the south to Etna Bay; like *finschi* but flank plumes pale golden yellowish.

d) *pulchra* (Mayr and de Schauensee); Misol Island; like *minor* but brown parts of plumage more purplish red; plumes like those of *jobiensis*.

NESTING AND DISPLAY The nest is a cup-shaped structure of sticks and vines, twenty feet up in a fork of a branch of a slender tree in the forest near a native garden. Nest constructed by female alone. A single cream-coloured egg with longitudinal streaks and patches of brown, red-brown and purplish grey; size 36 × 26 mm.

The males gather into groups of up to a dozen adults with some immatures in the treetops and display in an area of horizontal and sloping branches, sometimes in one tree, sometimes spread through several adjacent trees. These displaying trees are sometimes near native villages and have been used, the natives say, for generations. Certain

branches are frayed and brown from use. One bird was seen to peck off leaves and drop them, perhaps opening the area so sunlight could come in. The full display pose seems to be with head lowered, wings extended laterally, and plumes raised to cascade over the back. A number of birds may display at once. As the birds spasmodically dance and chase, hopping and shaking their plumage, there are periods of near-silence, and then periods when loud calls ring out noisily. Frequently young males come to the display areas and though lacking ornamental plumes go through display poses. A bird, presumed to be a female, approached a male, perched quietly, was displayed to by the male with shaking plumes, who then stiffened into a frozen pose. Though the female pecked at his neck, no mating occurred.

REMARKS The lesser bird of paradise is a common species whose wide variety of calls dominate the forest and forest edge. The birds frequent the treetops and eat both fruits and insects.

***Paradisaea decora* (Salvin and Godman)**

Goldie's Bird of Paradise. Length 13¼ in. Adult male: upperparts, including scapulars and wing-coverts, glossy straw-yellow washed with orange, richest on head (plumes of head and neck short and stiff); forehead, lores, and chin black with a green gloss; sides of head below eye, throat and upper neck metallic green (the feathers short and compact); a sub-obsolete jugular collar yellow; breast and abdomen lavender-grey, becoming more vinaceous grey on lower abdomen; on sides of breast an enormous erectile feather fan (with plumes up to 490 mm long) dark crimson becoming more brownish red on outer third, with the plumes generally lax, lace-like and tipped with whitish; at sides of breast at base of feather fan a large short tuft (of both red and grey plumes) tipped vividly with purplish black; wings and tail above faded brown (washed with dull straw-yellow on inner primaries); the latter with the central rectrices immensely elongated (up to 400 mm), wire-like (except at bases) and blackish; iris yellow; bill bluish; feet dark slate; wing 179 mm, tail 139 mm, exposed culmen 33 mm, tarsus 42 mm. Female: upperparts, including wing-coverts, generally dull olive washed with straw-yellow; crown and sides of head and neck straw-yellow washed with dull orange; forehead, lores, sides of head below eye and entire throat dull brownish black; a sub-obsolete pale yellowish jugular band; underparts dull orange buff tinged with vinaceous and indistinctly barred with dark brown; wings and tail faded olive cinnamon-brown; iris bright yellow; bill milky blue-slate; feet fleshy slate; wing 157 mm, tail 131 mm, exposed culmen 33 mm, tarsus 38 mm.

RANGE D'Entrecasteaux Archipelago (Fergusson and Normanby Islands).

REMARKS Apparently much like the raggiana bird of paradise in habitat and behaviour.

***Paradisaea rubra* (Daudin)**

Red Bird of Paradise. Length 13 in. (without elongated central tail 'straps'). Adult male: forehead black with a green gloss; forecrown feathers slightly elongated and iridescent green; hind crown, hind neck, upper wing-coverts and foreback yellow changing to orange in middle of back; lower back maroon washed orange; rump and upper tail-coverts yellow; wing quills maroon; tail maroon except for much elongated (up to 585 mm) central quills which are black, horny and strap-like, about 5 mm wide, and twisted; lores and chin black with green gloss; throat iridescent green followed by a broad yellow collar which joins the yellow of hind neck and extends to sides of breast; rest of underparts maroon, darkest on upper breast; and ornamental tuft of plumes from each side of breast up to 320 mm long and sharply curved down near tip, red in colour, becoming darker on outer quarter and with pale brownish grey tips which are lace-like; iris brown; bill greenish yellow; feet brownish green; wing 175 mm, tail 130 mm (central 'straps' to 585 mm), exposed culmen 30 mm, tarsus 44 mm. Female: front half of crown blackish brown, hind crown dull yellow changing to yellowish brown on foreback; rest of upperparts maroon; forepart of sides of head and throat blackish brown like forecrown; lower throat and sides of neck, and sides of upper breast dull buffy yellowish; rest of underparts pale maroon; wing 150 mm.

RANGE In western Papuan islands of Waigeu, Batanta (Ghemien?) and Saonek.

DISPLAY As many as ten adult males may display in a single treetop in the forest, where the birds select dead, leafless branches in the crown of the tree. Females or immature males may keep on the outskirts of such a display gathering. The full plumaged males continually move from branch to branch, quivering their ornamental plumes, rapidly beating their wings, and uttering various loud calls.

In captivity, the display has been recorded as follows: (a) the male stood with body parallel to the perch, green head feathers fully distended, and then the wings were moved slightly away from the body and vibrated rapidly; (b) the body was suddenly jerked erect, the wings continuing to vibrate rapidly; (c) the bird then lowered its body and hopped down the slanting perch, finally holding its pose for some moments, vibrating its wings all the time. The breast plumes were not spread; presumably they are used in other forms of display.

REMARKS The red bird of paradise is apparently a common, noisy bird in the forest.

***Paradisaea guilielmi* (Cabanis)**

Emperor of Germany's Bird of Paradise. Length 12 in. (without tail 'wires'). Adult male: forehead to central area of crown iridescent green; hind crown, hind neck, foreback and lesser and middle wing-coverts yellow, more golden on nape; rest of upperparts deep reddish maroon, including the elongated (up to 575 mm) wire-like central tail feathers which have a trace of vanes at tips; side of head to back of eye, throat, and upper breast iridescent green, followed by an incomplete narrow yellow collar which joins the yellow of side of neck; rest of underparts dark maroon tinged grey on abdomen and with yellow and white ornamental tufts on sides of breast, of which the terminal portion is very lace-like; iris brown or yellow; bill blue-grey; feet blue-grey or brown; wing 175 mm, tail 112 mm, central 'wires' of tail up to 575 mm, exposed culmen 36 mm, tarsus 44 mm. Female: crown chocolate-brown; nape pale yellow; hind neck and foreback straw-yellow with maroon bases of feathers showing through; lesser and middle upper wing-coverts maroon edged with greyish olive; rest of upperparts maroon; anterior side of head (to behind eye), throat and upper breast chocolate-brown; an obscure narrow yellowish band across middle of breast joining yellow of sides of neck; rest of underparts pale vinaceous brown with a suggestion of fine barring; wing 159 mm.

RANGE Huon Peninsula, 3,200 to 5,500 ft.

NESTING AND DISPLAY Two eggs (or one?), in colour creamy to rosy cinnamon streaked with red-brown and grey; size 36·5 × 26 mm. (Rothschild, 1912.)

It has been suggested that this species displays in groups in treetops.

In captivity, the display starts with the body in a horizontal position, head and neck extended, bill pointed down. The bird bobs up and down, then the wings are spread in a horizontal plane and vibrated with the ornamental plumes somewhat raised and spread. Suddenly the bird calls loudly and turns head first under the perch. The body is held horizontal under the perch, and close to it, wings fully spread, tail spread and pointed up and head and neck also turned up. The climax of the display comes with the spreading of the breast plumes to form a circle around the abdomen, the head, tail and wings being outside the circle. The body now moves from side to side causing the plumes to wave gracefully; a display that may last five minutes.

REMARKS This is apparently a common species in the mid-mountain forest of the Huon Peninsula.

***Paradisaea rudolphi* (Finsch)**

Blue Bird of Paradise. Length 11 in. (without elongated tail 'straps'). Adult male: top of head, neck, back, rump and upper tail-coverts black, glossed with bronze on head, tinged brownish on hind neck, greyish on rump, and washed bluish on upper tail-coverts; tail blue, the central pair of feathers much elongated (up to 415 mm), narrow (about 5 mm) and black; upper wing-coverts and inner secondaries blue, outer secondaries externally edged blue; primaries black externally edged blue towards base; side of head (except for white eyelids), side of neck and throat black, more or less glossed bronzy; upper breast dull black; lower breast black washed with deep blue changing to cobalt posteriorly; abdomen glossy black; under tail-coverts brownish black; under wing-coverts rufous; on each side of breast an ornamental tuft (up to 240 mm long) of lacy structure. The ornamental tuft, seen from below, is pale purplish blue on the terminal third, opalescent blue on central third, and cobalt blue on basal third, and just in front of this tuft is a tuft of partly rust-red, partly velvety black feathers, spreading laterally from the abdomen; seen from above the ornamental tuft is largely pale rufous and the ivory-white of the basal part of the shafts is very evident; iris brown or dark blue; bill whitish blue; feet light to dark grey; wing 155 mm, tail 80 mm, central strap-like tail feathers up to 415 mm, exposed culmen 31 mm, tarsus 40 mm. Female: upperparts like male but duller and with less brown wash in hind neck; sides of head (except broad white eyelids), neck and throat blackish; rest of underparts, including under wing-coverts, reddish brown, darker and with faint barring on breast and with obscure barring on abdomen; thighs black; wing 145 mm.

RANGE Mountain forests of eastern New Guinea, from 4,400 to 6,300 ft.

SUBSPECIES Four similar ones:

a) *rudolphi* (Finsch); mountains of south-east New Guinea (Wharton Range, Owen Stanley Range), westward in the northern watershed as far as the Mambare River.

b) *ampla* (Greenway); Herzog Mountains west to (subspecies?) the Kratke Mountains; very like *rudolphi*.

c) *margaritae* (Mayr and Gilliard); mountains of the upper Wahgi River, Wahgi Divide and Kubor Mountains; like *rudolphi* but central abdomen and flanks uniformly barred.

d) subspecies?; mountains of the Tari region; like *rudolphi* but female unknown.

NESTING AND DISPLAY (Presumably a basin-shaped structure in a fork in a low tree in forest.) A single rich cream coloured egg, with longitudinal streaks of red-brown and grey; size 38 × 24 mm.

The male, with legs fully extended, hangs head downward from a perch, the plumes spread to form an inverted triangle, and the strap-like tail feathers rise to half their length, then droop down, one on each side. The wings are tightly closed and the bill turned upward. The body is moved back and forth and with the violent motion the plumes are frequently spread to their greatest extent and during the display the bird sings softly in a grating voice. This song is sometimes uttered when the bird is not displaying.

REMARKS This blue bird is generally a rather uncommon species, but locally has been found fairly common.

***Pteridophora alberti* (Meyer)**

King of Saxony Bird of Paradise. Length 9⅛ in. Adult male: a black and yellow-buff bird with on each side of nape a long (up to 16 in.) wire-like plume with horny scallops on one edge. In detail: crown to back velvety black with a faint bronze tinge, the back feathers lengthened into a 'cape'; rump and tail dusky black; wings black with an orange-buff area near base of quills; a long plume (up to 16 in.) from each side of nape, consisting of a wire-like shaft with a series of horny, scale-like projections (⅛ in. wide) on the outer side of the shaft. Above, the shaft is white, the projections glossy pale blue; on the underside brown; side of head and neck black, the feathers of the latter lengthened into a tuft (about 1½ in. long); throat and upper breast black, some of the feathers with small iridescent violet-blue tips; breast yellow-buff becoming buffy white on flanks and abdomen; under tail-coverts rich buffy-ochraceous; under wing-coverts and edges of basal half of wing quills ochraceous; iris dark brown; bill black; feet dark grey; inside of mouth pale green; wing 127 mm, tail 90 mm, culmen from base 23 mm, tarsus 32 mm. Female: upperparts, including wings and tail, dark brownish grey, darker on lower back, greyer on head and neck; underparts whitish with bold blackish bars on breast and sides, less distinct on throat, and abdomen nearly immaculate white; under wing-coverts and edges of basal part of wing quills buffy; under tail-coverts ochraceous; wing 118 mm, tail 93 mm.

RANGE New Guinea from Weyland and Snow Mountains to Central Highlands from 4,800 to 7,800 ft.

SUBSPECIES Three nearly similar races:

a) *alberti* (Meyer); Weyland and Snow Mountains to those of Sepik headwaters; female: underparts white with bold black barring.
b) *hallstromi* (Mayr and Gilliard); southern watershed of Central Highlands (Mt Hagen, etc.); like *alberti* but underparts generally whiter owing to narrower black barring.

c) *burgersi* (Rothschild); middle Sepik Mountains (Schraderberg) to north slopes of Central Highlands (Kratke Mountains); like *alberti* but underparts less white, more brownish buff.

DISPLAY The display is given on branches high in the forest, sometimes as high as eighty or ninety feet above the ground. Each male has a single favourite perch, a dead branch in or above the tops of the trees, or a thin, horizontal branch under the main canopy. Each display place is used by a single male, other males' display branches are 400 yards or so away. The male spends much of the day perched near the display area, often calling, and occasionally coming to the display branch and displaying.

A display of the male to the female is summarized as follows: the male was perched, with the long head plumes steeply elevated over the back. Violent motions of the body caused the slender perch to bounce up and down six inches or so. As the bird bounced, its back feathers were expanded and retracted over the shoulders like a short cape being opened and closed. Meanwhile, the long head plumes were brought forward and the head bowed slowly forward and down, a dozen times during the fifty or so bounces the bird made. All this time the male made a constant hissing noise.

The female approached the displaying male through the leaves and over small perches. When within three feet of the male, the female had her bill partly open and wings fluttering, like a nestling begging for food. She approached to within eighteen inches of the male, where his long head plumes were sweeping just in front of her. The male left the perch and the female flew away, closely followed by the male. One would have expected the mating to take place at the display area, so that this seems an incomplete performance, but perhaps actual mating takes place after a chase.

REMARKS These birds live in the middle and upper part of the mountain cloud forests and come to fruit trees to feed. They utter a powerful, hissing call note which has given rise to the native name 'kiss-saa-baa'.

### *Loria loriae* (Salvadori)

Loria's Bird of Paradise. Length 8–9 in. Adult male: an all-black bird, with iridescent patch on head but no elongated plumes; tail shorter than wing; bill rather stout and about as long as head. In detail: forehead and lores iridescent blue-green; rest of upperparts velvety black with a slight purplish gloss and inner secondaries glossed with blue or purple; side of head and throat and breast velvety black; abdomen dull black; iris dark; bill black, gape yellow-white; feet black; wing 99 mm, tail 71 mm, culmen 25 mm, tarsus 38 mm. Female: upperparts yellowish green, many of the feathers with obscure dark margins giving a slight

scaled appearance but wing quills strongly washed with olive-brown, and tail lightly tinged olive-brown; throat and breast like back but paler; abdomen still paler, yellower and feathers without dark edgings; wing 103 mm, tail 75 mm.

RANGE Central ranges of New Guinea, from Weyland Mountains to south-eastern New Guinea; from 5,000 to 8,500 ft.

SUBSPECIES Two similar ones:

a) *loriae* (Salvadori); the range of the species except that of *amethystina*; gloss of inner secondaries blue-green.

b) *amethystina* (Stresemann); mountains of middle Sepik to Hagen Mountains; like *loriae* but gloss of inner secondaries more purplish.

NESTING The nest is not known. The male calls (and displays?) on a branch well up in a forest tree. The calls are powerful, deep, bugle-like sounds repeated at intervals and have a ventriloquistic quality.

REMARKS This bird was usually found sitting quietly or moving about slowly in the leafy substage of the forest. Its diet seems to be wholly fruit.

***Loboparadisea sericea* (Rothschild)**

Yellow-breasted Bird of Paradise. Length 6½–7 in. Adult male: brown and yellow above, yellow below, without ornamental plumes or iridescence; bill short with wattles covering base; tail shorter than wing. In detail: crown and upper half of side of head deep coffee-brown (or yellow-olive); upper back dark reddish brown with a yellowish gloss (or yellow-olive); lower back to upper tail-coverts rich golden yellow, the feathers silky and glossy; wings and tail chestnut-brown, the wing quills with dusky tips; underparts glossy, silky pale yellow; iris brown; wattles blue-green; feet black; wing 90 mm, tail 51 mm, culmen 20 mm, tarsus 32 mm. Female: upperparts dark olive, feathers of crown and back with faint dark edges giving an obscure scaled pattern, and outer wing quills with reddish brown outer margins; throat and breast buffy ochraceous with dusky streaks; abdomen paler, more buffy and not streaked; wing 97 mm, tail 60 mm.

RANGE New Guinea from Weyland to Herzog Mountains, from 4,200 to 6,100 ft.

SUBSPECIES Two well marked ones:

a) *sericea* (Rothschild); western part of the species range; Weyland and Snow Mountains and those of the Sepik headwaters.

b) *aurora* (Mayr); Herzog Mountains (and north part of Central Highlands?); like *sericea* but male with upper back yellow-olive.

NESTING The nest is not known, but natives say that the bird makes an

open nest of moss placed at only a moderate distance from the ground on a branch, and that one egg is laid (Stein, 1936).

REMARKS The yellow-breasted bird of paradise is a quiet, lethargic creature found in the lower part of the forest where it moves slowly from branch to branch or sits quietly for long periods. Sometimes this species is seen in small parties of up to six individuals, but more often it is solitary (Stein, 1936).

***Cnemophilus macgregorii* (De Vis)**

Multi-crested Bird of Paradise. Length 9¾ in. Adult male: upperparts bright glossy orange-red shading to pale brownish orange on lower half of back and tail (in one race golden yellow shading to dull yellowish brown); forehead a tuft of six pale narrow olive plumes (up to 28 mm long) tinged with iridescent violet (and with the vanes folded into V-shape); inner secondaries and wing-coverts ochraceous or yellowish brown, rest of wing quills broadly edged with same; elongated feathering at base of maxilla, a narrow spot over eye, lower half of head and neck and all of underparts brownish black to blackish on abdomen; iris brown to grey; bill and feet blackish brown; wing 113 mm, tail 85 mm, exposed culmen 22 mm, tarsus 44 mm. Female: upperparts dark olive-brown with a trace of scaling; a small crest; wings and tail brownish olive; underparts generally pale brownish olive to buffy brown; inner edges of wing quills dull ochraceous buff; iris dark bluish grey; bill brownish black; feet brownish black; wing 112 mm, tail 90 mm. Young male: like female.

RANGE Eastern New Guinea from 7,600 to 11,000 ft.

SUBSPECIES Three, two well-marked:

a) *macgregorii* (De Vis); south-eastern New Guinea; male: upperparts largely golden yellow, lower parts brownish black.
b) *sanguineus* (Iredale); Hagen Mountains; like *macgregorii* but upperparts bright orange-red and underparts dark chocolate-brown.
c) *kuboriensis* (Mayr and Gilliard); Kubor Mountains; very like *sanguineus* but slightly paler, less red, more orange above.

NESTING A soft, thick nest is apparently placed in a hole in the top of a rotten stump a few yards up in dense, shady forest. The walls of the nest are of green moss, ferns and rootlets, and with an inside cup lined with dead leaves and cassowary feathers. A single white egg with an irregular ring of blackish brown spots near the larger end and a few dark spots and some grey patches elsewhere; size 31·5 × 20 mm.

The single young is fed on fruit by the female alone, with no male in attendance.

REMARKS This is a rather shy bird found in the lower part of the forest, often in the tangled undergrowth where even the male with its striking inverted colour pattern is difficult to see. The birds feed on the small fruits of shrubs and low second-storey trees of the forest, and when feeding can sometimes be closely approached. The rudimentary crest giving the effect of a longitudinal groove on the forehead easily distinguishes the female from the somewhat similar *Amblyornis* which also occurs in the same localities. The males are sometimes much less common than the females.

This bird has a variety of calls: a low, harsh, hissing call, a loud, dull clicking call repeated a number of times, and a low, startling call best likened to the sound of two timbers being rubbed together under considerable stress.

## Family Ptilonorhynchidae *Bowerbirds*

*(Fifteen species, nine in New Guinea)*

This is a New Guinea and Australian family of fifteen species, seven of which are restricted to New Guinea, and two others shared with Australia.

Certain species seem to pair monogamously and the males share in nest duties, but others build elaborate bowers which are used in courtship and mating, and in these species the males are probably polygamous, and the females alone carry on nesting duties. Only a few species are brightly coloured, and it seems that in this family the bowers and their ornamentation have been developed at the expense of plumage ornamentation, in contrast to the situation with the birds of paradise. Bowerbird nests, as far as is known, seem to be simple cup-shaped structures, and the eggs are either plain or patterned.

Some species are savannah or grassland and brushland birds, while others live in the forest. Though they have loud and varied cries, these birds are usually less obtrusive than many birds of paradise. They seem to live in the trees and their diet is mainly fruit varied occasionally with insects.

### Synopsis of *Ptilonorhynchidae* Species

1 ARCHBOLDIA One species; length 12–15 in.; plumage above and below mostly sooty black; males of one subspecies at least with golden crown and crest. Bower a mat of ferns.

2 AMBLYORNIS Four species; length 8–10 in.; plumage above plain brown or rusty brown to olive-brown; below paler, ochraceous or buffy brown; males of some species with orange or yellow crests. Bower with a tower of sticks.

3 XANTHOMELUS Two species; length 9–10 in.; males mostly orange and yellow or mostly black with orange-red crown and golden cape covering foreback; females mostly plain brown above, breast whitish with distinct scaled dark pattern, or yellow with obscure dark scaled pattern. No bower.

4 CHLAMYDERA Two species; length 10–11 in.; upperparts grey-brown to olive-brown, obscurely patterned with grey; breast and abdomen ochraceous fawn or yellow; throat and upper breast conspicuously streaked grey or yellowish and dusky. Bower with a two- or four-walled avenue of sticks.

5 AILUROEDUS Two species; length 10–11 in.; back, uppersurface of wings and tail emerald green; breast buffy white to light brownish, spotted or with a scaled pattern of black. No bower.

***Archboldia papuensis* (Rand)**

Archbold's Bowerbird. Length 14½ in. Adult male: generally blackish (in one race at least forehead and crown tipped broadly with rich golden yellow and a long golden crest); shafts of remiges and rectrices (from below) ivory; iris deep brown; bill black; feet dark grey; wing 159 mm, tail 169 mm (one race 135 mm), culmen from base 25 mm, tarsus 42 mm. Female: like male but somewhat more greyish, less blackish; head solidly blackish; an ochraceous spot on leading edge of wing formed by light bases of outer primaries and upper wing-coverts; wing 156 mm, tail 143 mm (one race 126 mm).

RANGE Very local in the mountains of the main body of New Guinea in Central Highlands and Snow Mountains from 6,700 to 8,900 ft.

SUBSPECIES Two well marked races:

a) *papuensis* (Rand); northern slopes of the Snow Mountains; dark sooty grey with traces of olive on outer vanes of wings; tail 135 mm.

b) *sanfordi* (Mayr and Gilliard); the Mt Hagen area; like *papuensis* but blacker, tail longer (169 mm), and with a prominent golden crest in the male.

BOWER This is constructed on the ground in the forest. A bower seen can be described as follows: it consists of a five-foot wide mat of brown fern fronds on a fairly level area well covered with moss and ferns. The edges of the mat are decorated with piles of black beetle wings, blue-black and also faded grey snail shells, blue berries, and black and bright amber rosin chips from tree ferns. Around the edges of the bower are golden yellow, climbing bamboos, and the bird has draped some dried fern fronds over nearby branches about and above the bower, forming in places a fairly heavy curtain. On nearby fallen tree trunks and on

moss-covered horizontal limbs near and over the bower are some marble-sized green fruits, pieces of charcoal and whitish snail shells.

A solitary male constructs a bower and keeps it in repair. Much of the day the male sits in trees near the bower where he squawks and utters a variety of ventriloquial notes. Occasionally he brings new decorations to the bower or arranges those already there. On one occasion, while the male was calling, a female came to the bower. Immediately the male flew to the mat of ferns, flopped prostrate, began a constant churring, and started crawling towards the female who perched on low branches at the edge of the bower. When crawling the male held his wings and tail partly open and pressed down but the golden crest was folded flat. Only his head was up, usually with the bill pointed towards the female and holding a piece of vine. The bill was opened and shut while the wings were fluttered. As the male approached the female she moved to a new perch and he began a new approach. The bird finally disappeared for a time, and then the male returned and rearranged the bower ornaments.

REMARKS This species was the last species of bowerbird to be discovered; in 1939. When not breeding it seems to spend a great deal of time in the tops of forest trees, where it eats fruit. Dr Ripley wrote to say that his newly collected specimens from the Snow Mountains have some in-growing yellow feathers on the crown, indicating that *A. p. papuensis* may have a yellow crest.

### Key to *Amblyornis* Species

1 With long orange-red or yellow crest: (males only) 2.
Without crest: (females and one male) 4.
2 Crest yellow: (male, female unknown) *A. flavifrons.*
Crest orange-red: 3.
3 Throat and breast streaked: *A. subalaris.*
Throat and breast not streaked: *A. macgregoriae.*
4 Under wing-coverts greyish buff (Vogelkop area only): *A. inornatus.*
Under wing-coverts rich ochraceous buff (not in Vogelkop): 5.
5 Throat and breast streaked: *A. subalaris.*
Throat and breast not streaked: *A. macgregoriae.*

### *Amblyornis inornatus* (Schlegel)

Gardener Bowerbird. Length 10 in. Adults: upperparts generally dark brownish olive tinged lightly with amber on the upper back; top of head somewhat darker, more brownish becoming more pale brownish olive on sides of head; underparts pale ochraceous or buffy brown, becoming darker, more olivaceous on sides of body and more pale buffy on lower abdomen; flight feathers dark brown with indistinct dark

olive outer edges; under wing-coverts pale ochraceous buff; iris dark brown; bill blackish, paler on lower mandible; feet dark grey to steel-blue. Male wing 131 mm, tail 92 mm, bill from base 23 mm, tarsus 37 mm. Female slightly smaller.

RANGE Vogelkop and Wandammen Mountains, from 3,800 to 9,000 ft.

BOWER An oval or cone shaped hut-like structure is made, with a 'garden' in front, the whole placed on a level area of ground in the forest. The bower is described as being about three feet tall and five feet wide at the base. Twigs are piled round a sapling to form a conical pillar, and this is apparently the central support of the bower. The 'roof' of the hut, which is composed of long, slender stems (of orchids, in one case at least), rests on the ground and leans against the central sapling on three sides, the fourth being left open to provide a wide 'door'. The ground within the 'hut' (that is, its 'floor') is clean of all debris, and the ground in front of the hut is similarly cleared of all leaf litter. This last provides the space for the 'garden' which may be moss-covered. On this cleared patch are placed little beds or heaps of yellow or blue fruit, charcoal and small black stones, big mushrooms and freshly picked flowers. When ornaments fade or decay they are discarded and replaced. Red shotgun cartridge cases have been used in decorating the garden.

A single male has been seen cleaning the bower.

REMARKS This is the only species of the genus in north-west New Guinea.

***Amblyornis macgregoriae* (De Vis)**

MacGregor's Bowerbird. Length 10⅓ in. Adult male: upperparts olive-brown; sides and top of head and neck olive-brown with an amber cast; central crown and nape with a large, semi-glossy, golden orange crest (with plumes 43–78 mm long), with some of the lateral plumes almost solid brown, and the crest with traces of fine brown tipping; underparts clay-brown with traces of white streaking on the upper breast and with an ochraceous wash on the abdomen; axillaries, wing linings, and inner edges of flight quills pale orange-yellow; wings and tail dark olive-brown; iris dark brown; bill, upper mandible black, lower mandible light horn; feet dark grey; wing 142 mm, tail 88–95 mm, culmen from base 27 mm, tarsus 38 mm. Female like male but without crest.

RANGE Mountain forests of the main body and of eastern New Guinea including the Huon and south-eastern Peninsulas, from 3,800 to 9,000 ft.

SUBSPECIES Two similar ones and one well differentiated occur:

a) *mayri* (Hartert); Weyland and Snow Mountains; tail and the crest generally long.

b) *macgregoriae* (De Vis); mountains of central and eastern New Guinea exclusive of Huon Peninsula (from Hindenburg Mountains east to Herzog Mountains and those of south-eastern New Guinea); like *mayri* but tail and crest somewhat shorter.

c) *germanus* (Rothschild); mountains of Huon Peninsula; like *mayri* but crest much shorter (43 mm).

NESTING The nest is a fairly deep, firm cup placed seven feet up in a small tree in deep forest; nest composed of bark and rootlets, with a few large leaves at base; lined with black wire-like rootlets; a single yellowish white egg.

BOWER The bower is found on level ground in the forest and is a saucer-shaped structure from the centre of which rises a column built of twigs around a sapling.

The 'saucer' of moss is two to three feet across, as much as six inches in thickness, and with a smooth, compact surface. The central column is built of twigs and sticks up to sixteen inches long, criss-crossed around the sapling to a height of three to four feet. This column may be about eight inches in diameter at the base, but higher up it is thicker.

Decorations are of two types: (a) little tassels of animal silk hung on the twigs of the basal foot or so of the central column, tassels which dangle and spin in the wind, and sometimes clusters of berries; and (b) pieces of ash-white or blackish lichens are sometimes placed on the raised outer rim of the 'saucer' and bits of black lichen and charcoal just outside it.

A bower seems to be the property of a single male who attends, cleans and repairs it day after day, perhaps for six months or more, and the same bower probably is used year after year. The male spends much of his day perched in trees near the bower, from where he may call noisily, giving a wide variety of calls, some of which seem to be imitations of other birds. At the bower, however, he is silent.

Apparently, an unattended bower may be raided by another male who takes sticks from it for his own bower. Birds without a crest, presumably immature males, are occasionally seen attending a bower. Observations at the bower have yielded little information beyond the fact that when a female joins the male there is a series of whistles and screeches, a pointing of the male's bill towards the column, a displaying of the crest, and a confused flitting about and chasing. (Bulmer.)

REMARKS This is a common but shy bird found in the upper mountain forests where it feeds on the fruits of trees.

***Amblyornis subalaris* (Sharpe)**

Striped Bowerbird. Length 8¾ in. Adult male: upperparts including forehead, sides of head and neck dark olive-brown, the forehead strongly washed with chocolate-brown; crown with long slender hair-like, glossy feathers golden-orange tipped finely with dark brown forming a broad erectile crest; the lateral crest feathers often chocolate-brown (the crest very variable in size and coloration); underparts olive-brown, the feathers with pale centres forming pale ochraceous streaks which are most pronounced on throat and abdomen; axillaries and under wing-coverts apricot ochraceous; iris brown; bill blackish; feet slate-grey tinged with olive; wing 125 mm, tail 88 mm, culmen from base 23 mm, tarsus 37 mm. Female: like male but somewhat paler and with the ventral streaking more buffy, less ochraceous; wing 121 mm.

RANGE Mountains of south-eastern New Guinea from 2,200 to about 3,600 ft.

NESTING A cup-shaped nest with a single yellowish white egg has been described for this species.

BOWER The bower is built on the ground in the forest and is a rough, untidy, somewhat hut-like structure of twigs, some two feet high by three feet wide and with a small garden in front of it. From descriptions and photographs, the bower seems to consist of a floor, walls and roof of twigs supported by a central column of twigs criss-crossed about a central sapling and with a wide opening or door at the front. It seems, however, rather untidily put together and has been interpreted as a mass of twigs with a semicircular tunnel running through it; the two openings close together.

In front of the 'door' is an area of smooth ground covered with black fibres from the stems of tree-ferns. On this black bed the bird places flowers, berries, bright-coloured leaves and beetle wings.

REMARKS This is the lower altitude representative of the MacGregor's bowerbird which builds quite a different bower.

***Amblyornis flavifrons* (Rothschild)**

Yellow-fronted Bowerbird. Length 9½ in. Adult male: upperparts dark rufous to rusty brown; entire forecrown and crown bright yellow, the feathers of the central and hind crown glossy and very narrow (with ivory shafts), and elongated (plumes up to 50 mm) forming a broad crest; some of the feathers at rear of crest brownish; sides of head including lores, area encircling eyes, and entire under aspect of head, throat, neck, and sides of upper breast olive-brown tinged with rust-colour; underparts including axillaries and wing linings buffy ochraceous to pale apricot; inner edges of flight quills pale buff; shafts of remiges and

rectrices ivory; bill (in dried skin) black; feet (in dried skin) dark brown; wing 134 mm, tail 83 mm, culmen from base 23·5 mm, tarsus 33·5 mm. Female unknown.

RANGE From an unknown locality probably in western New Guinea. Apparently known from four native trade skins (males) which arrived in Europe as millinery objects more than half a century ago.

**Key to *Xanthomelus* Species**

1 Crown and cape over foreback red-orange: (males) 2.
Upperparts all brownish: (females) 3.
2 Breast and abdomen yellow: *X. aureus.*
Breast and abdomen black: *X. bakeri* (male).
3 Abdomen pale yellow: *X. aureus.*
Abdomen buffy white with dark bars: *X. bakeri* (female).

***Xanthomelus aureus* (Linnaeus)**

Golden Bowerbird. Length 10 in. Adult male: crown orange; back and sides of neck and foreback orange, the feathers much elongated and decomposed forming a massive cape or ruff (probably erectile); rest of upperparts yellow except for inner flight feathers being narrowly, the outer ones very broadly tipped with black, alula partly black and tail black; breast and abdomen yellow; throat and sides of head to eye differs in the subspecies, either black, or throat yellow and sides of head orange; underside of tail black; iris yellow; bill black to horn-colour around nostrils; feet greenish grey; wing 144 mm, tail 85 mm, culmen from base 23 mm, tarsus 45 mm. Female: upperparts and head brown tinged with grey on upper back; sides of head pale brown tinged with ochraceous; throat pale greyish brown with a suggestion of spotting; upper breast dull yellow with some narrow brown barring (clear greyish brown in one race); remaining underparts, inner edges of flight quills, and wing linings yellow, the last with some brown spotting; iris brownish; bill black; feet grey; wing 139 mm.

RANGE Locally distributed in foothills and lower mountains of the main body of New Guinea and Vogelkop from about sea level to 4,500 ft.

SUBSPECIES Two very distinct races:

a) *aureus* (Linnaeus); north-western New Guinea (Vogelkop, Wandammen and Onin Peninsulas, Gebroeders and Snow Mountains); as described with throat, face, and the eye-ring black.
b) *ardens* (D'Albertis and Salvadori); southern New Guinea from Wataikwa River eastward to upper Fly River and probably the southern foothills of Mt Hagen, south to the Fly River delta region (Wassi Kussa River); like *aureus* but with the throat yellow, not black, and the sides of the head scarlet, not black.

REMARKS The golden bowerbird feeds in the treetops on various fruits. Little has been recorded about its habits, and since its bower has not been found, one suspects that unlike its near Australian relatives, it does not make one. However, this point merits the attention of field naturalists.

### *Xanthomelus bakeri* (Chapin)

Beck's Bowerbird. Length 10¾ in. Adult male: generally solid black with a faint bluish sheen on throat and chest; except for crown which is scarlet becoming paler, more cadmium-orange with a scarlet wash on nape and hind neck; the whole of the red and orange area with a silky sheen; the feathers of the hind neck long, decomposed (and probably erectile), forming a prominent cape (with some plumes up to 47 mm long) which in the folded position conceals the black back; remiges and rectrices black, the former with the basal parts (to three-quarters) bright cadmium-yellow, forming a prominent wing patch; iris pale yellow; bill dark grey with a whitish base; feet blackish; skin behind eye black; wing 142 mm, tail 81 mm, culmen from base 23 mm, tarsus 42 mm. Female: upperparts, wings, and tail generally dark brown with indistinct greyish tips on upper back and shoulders; head like upper back; sides of head, throat, and neck brownish with an ochraceous wash; throat dull whitish tinged with brown and finely tipped with pale brown; remaining underparts whitish with a faint yellow wash and with a scalloped appearance due to much bold, narrow, dark brown barring, except central abdomen, which is immaculate; under tail and under wing-coverts whitish tinged with yellow and with some brown markings; iris dark brown; bill blackish brown; feet lead-grey; wing 139 mm.

RANGE Known only from the Adelbert Mountains above 3,100 ft (inland from Madang in north New Guinea).

REMARKS This is a fairly common forest species in its limited range, where it lives in the tops of the trees and gives loud calls. The local natives know nothing of a bower; the bird may display in the treetops.

### Key to *Chlamydera* Species

Abdomen yellowish: *C. lauterbachi.*
Abdomen ochraceous fawn colour: *C. cerviniventris.*

### *Chlamydera cerviniventris* (Gould)

Fawn-breasted Bowerbird. Length 11–12 in. Adults: top of head greyish brown, the forehead streaked with greyish white; back, rump, upper tail-coverts and upper wing-coverts dark brown, the feathers with fine greyish shaft streaks and narrow grey tips; wing, and tail dark brown, the quills edged with grey and the secondaries and tail quills tipped

with the same; sides of head greyish brown finely streaked with buffy grey; throat buffy finely streaked with brown, the streaks becoming broader on upper breast; rest of underparts fawn to ochraceous; iris dark brown; bill black; feet greenish brown to grey; inside of mouth deep yellow. Male wing 148 mm, tail 110 mm, culmen from base 31 mm, tarsus 42 mm. Female slightly smaller.

RANGE Northern Australia (Cape York Peninsula), islands of Torres Strait, eastern New Guinea (west in south to the Fly River delta, west in north to Humboldt Bay and Sentani Lake region), also Vogelkop; from sea level to about 1,700 ft.

NESTING The nest is a loose cup of small sticks, fifteen feet up in a fork of a tree in open savannah, 150 yards from nearest bower; a single roundish oval egg (or two), cream-coloured, scrawled prominently with dark zigzagging lines and thin scratches; size 39 × 27 mm.

BOWER Though savannah trees formed the usual habitat of the fawn-breasted bowerbird, the bowers were placed on the ground and protected by vegetation under a shrubby tree or on the forest edge.

The avenue-type bower, composed entirely of slender, unbranched sticks, was a very firm structure. It consisted of a thick, solid floor with two parallel walls of vertical sticks embedded in the floor, and at each end of the runway or avenue, a spreading platform. One platform was usually larger than the other, and it was on the larger that most of the decorations were placed, though some were also spread on the upper edges of the passageway, along its bottom, and a few on the smaller platform. These decorations were usually green fruit with sometimes a few fleshy green leaves. The bowers varied greatly in size, though they were rather uniform in construction. One moderately large bower was four feet long, with an avenue twenty-two inches long and twelve inches high inside (twenty inches outside); one platform measured two feet across, the other twenty inches. Platforms were from four to fourteen inches thick.

Observations at the bower have all been incomplete. A single male spends long periods at or near the bower and makes short trips away from it. Sometimes the male perches in trees near the bower and gives a wide variety of calls. On occasions the quite silent bird stays inside the avenue, or rearranges the ornaments and inserts sticks here and there. On a few occasions, after the male had given a series of calls, a group of several other bowerbirds approached and the male postured and danced in the bower. Once a bird, presumably a female, entered the avenue and crouched, presumably soliciting the male who continued to dance usually with a spray of green berries in his bill. Though no mating was seen, when a stuffed female was placed in a bower the male attempted to mate with it.

REMARKS The fawn-breasted bowerbird is a common, characteristic bird of trees in the savannah and forest edges. While fruit is its favourite food, insects are occasionally eaten.

***Chlamydera lauterbachi* (Reichenow)**

Yellow-breasted Bowerbird. Length 10–11 in. Adults: top of head yellowish brown-olive; back, rump, upper tail-coverts and upper wing-coverts brown washed with olive, the feathers with pale shafts and yellowish olive edgings except for the greater wing-coverts and upper tail-coverts which are broadly tipped with buffy; inner secondaries broadly tipped with buffy and all wing quills edged olive; tail dusky edged laterally with olive and terminally with yellowish white; side of head olive-brown with fine buffy grey streaks; throat yellowish or buffy white streaked with brown; upper breast more yellowish and with broader streaks; rest of underparts pale yellow with obscure barring on the flanks; iris brown; bill black; feet yellowish brown; naked skin behind eye dark grey; wing 132 mm, tail 105 mm, culmen from base 25 mm, tarsus 40 mm.

RANGE Lowlands and mid-mountain valleys of north New Guinea (from Geelvink Bay east to the Wahgi and upper Ramu Rivers) and south New Guinea (east to Digul River), from sea level to about 5,800 ft.

SUBSPECIES Two very similar ones:

a) *lauterbachi* (Reichenow); Ramu, Sepik, Baiyer, and Wahgi Valleys.
b) *uniformis* (Rothschild); Siriwo River valley (at head of Geelvink Bay) and lowlands of south New Guinea from Kamura River eastward, probably to Digul River.

NESTING The nest is a fairly open, flimsy cup four to eight feet up in a sapling fork or in a cluster of close-growing shafts of cane grass; it is made of grass stems and a few vines; lined with thin, dark fibres and grasses and with a foundation of sticks. It is usually placed in a cane grass swamp or in a bushy situation bordering a grassfield; usually near a running stream. A single oval pale sea-green egg, closely scrawled and irregularly streaked and encircled with brown; size 43 × 28 mm.

BOWER The bower is placed on the ground in an open area in tall grass country or, less often, on the edge of forest. It is of the avenue type, with a main runway or avenue and a screening wall at right angles at each end, each wall composed of slender sticks stuck into a foundation of cane grass and sticks. The bower is lined with brownish grass. The whole is a firm, solid structure. Bowers range from two to three feet long, one to two feet high, and nineteen to twenty-six inches wide. The central passage or avenue measures from six to twelve inches long. The chief ornamentation is of stones, some slate coloured, but red and greenish-

blue berries are also used. The ornamentation is chiefly placed in the end passages, inserted in the vertical face of the end walls, and in the centre of the main avenue.

Observations at bowers have yielded incomplete knowledge of courtship habits, but one male sometimes sits alone near the bower and calls and goes to the bower and arranges the sticks and ornaments. On three occasions a female (presumably) visited the bower while the male was in attendance, and it seemed that the male picked up a red berry as if to influence her.

REMARKS The yellow-breasted bowerbird lives in the old grass (kunai) fields and cane grass stands in which are scattered bushes and trees, and also on the edges of the forests. Locally the species may be abundant and a half dozen have been seen feeding on the fruit of a single tree in the grasslands.

### Key to *Ailuroedus* Species

Crown uniform brown, breast spotted: *A. buccoides*.
Crown black spotted with buff, breast with a scaled pattern: *A. crassirostris*.

### *Ailuroedus crassirostris* (Paykull)

Green Catbird. Length 11–12 in. Adults: crown black boldly spotted with buffy or brownish white (or feathers buffy with dark tips); hind neck with feathers brownish white with black edgings; rest of upperparts emerald green with a few semi-concealed buffy spots in foreback, small white tips to inner flight feathers (sometimes middle and greater wing-coverts) and small white tips to outer tail feathers; side of head mostly black, mixed with a little buffy; throat buffy white, the feathers edged with black; breast buffy to ochraceous, the feathers edged with black; rest of underparts buffy to ochraceous brown, sometimes with feathers darker towards tips, and faintly washed greenish; iris rusty brown or red; bill whitish; feet silver-grey; skin behind eye dark grey. Male wing 157 mm (to 174 mm in one subspecies), tail 119 mm, exposed culmen 34 mm, tarsus 49 mm. Female: slightly smaller; wing 152 mm.

RANGE Australia (eastern ranges from New South Wales to Cape York), Aru Islands, and New Guinea. From near sea level to about 5,600 ft; but usually in the mid-mountains in New Guinea.

SUBSPECIES IN NEW GUINEA Eight similar races:

a) *melanotis* (Gray); Aru Islands and southern New Guinea (Oriomo and Fly Rivers); head and collar with pale ochraceous spots; throat chiefly whitish; upper breast with pale buff spots; abdomen pale ochraceous buff.

b) *facialis* (Mayr); Nassau and Oranje Mountains; like *melanotis* but head and collar with rufous brown spotting.
c) *melanocephalus* (Ramsay); mountains of south-eastern New Guinea (west in south to Angabunga River; west in north to Mt Misim); like *melanotis* but abdomen more brownish, less buffy.
d) *astigmaticus* (Mayr); mountains of Huon Peninsula (up to 5,600 ft); like *melanotis* but head more solid blackish with fewer spots.
e) *guttaticollis* (Stresemann); Hunsteinspitze, Sepik Mountains; like *melanotis* but upper breast and abdomen more bright golden brown, less buffy.
f) subspecies?; Adelbert Mountains; like *melanotis* but throat more blackish and crown and collar spotting, also underparts much darker brown.
g) *jobiensis* (Rothschild); probably Weyland Mountains; like *melanotis* but throat and chest more blackish and underparts generally more brownish, less buffy.
h) *arfakianus* (Meyer); Arfak Mountains; like *melanotis* but throat slightly darker and underparts slightly greener.
i) *misoliensis* (Mayr and de Schauensee); Misol Island; like *arfakianus* but larger; wing 174 mm.

NESTING The nest is cup-shaped and bulky, formed of dead sticks and large dead leaves laid flat; the cup is rather neat and firm with a scanty lining of slender woody stems; placed eight to ten feet up in fork of a low forest tree. A single egg (perhaps two), oval unmarked, light olive-brown; size 25 × 39·5 mm. Both sexes share nest duties, and both feed the young. In one two hour and ten minute period the female visited a nest with young four times, the male five times. The young are fed on fruit.

REMARKS The green catbird is a common bird locally, and is found in the lower trees of the forest but it occasionally goes into the treetops.

### *Ailuroedus buccoides* (Temminck)

White-eared Catbird. Length 10 in. Adults: crown blackish brown to light mustard-brown (female usually paler than male); feathers of hind neck pale brownish with large black tips giving a prominent collar; rest of upperparts emerald-green, the inner secondaries with small white spots at tips; lores and an area behind and under eye mostly white; upper throat buffy to white with or without sparse black spots; rest of underparts pale yellowish buff to chestnut-brown, boldly spotted with black on breast, less so posteriorly (varies with subspecies); iris maroon; bill pearl grey; feet grey; skin near eye dark grey. Male wing 137 mm, tail 85 mm, culmen from base 30 mm, tarsus 37 mm. Female slightly smaller.




5 *Xanthomelus aureus*, Golden Bowerbird (top left); *Pteridophora alberti*, King of Saxony Bird of Paradise (top right); *Diphyllodes magnificus*, Magnificent Bird of Paradise (centre left); *Cicinnurus regius*, King Bird of Paradise (centre); *Diphyllodes respublica*, Waigeu Bird of Paradise (bottom left); *Cnemophilus macgregorii*, Multi-crested Bird of Paradise (bottom right); *Parotia carolae*, Queen Carola's Parotia (centre right).

RANGE Widespread in New Guinea and the western Papuan Islands. From sea level to 3,000 ft.

SUBSPECIES Four similar ones:

a) *oorti* (Rothschild and Hartert); western Papuan Islands (Waigeu, Batanta, Salawati) and Vogelkop east to the Siriwo River on Geelvink Bay; crown dark olive-brown; throat white; underparts pale ochraceous buff.

b) *buccoides* (Temminck); south New Guinea from Triton Bay eastward to upper Fly River; like *oorti* but throat tinged with brown and underparts rich chestnut-brown.

c) *stonii* (Sharpe); south coast of south-east New Guinea from Hall Sound to Port Moresby; like *oorti* but underparts much darker brown and spots fewer and much smaller especially on abdomen.

d) *geislerorum* (Meyer); Japen Island and northern New Guinea from the Mamberamo River eastward to Collingwood Bay; like *oorti* but crown much paler, more light mustard-brown.

NESTING The eggs are rich cream coloured; size 42·5 × 27·5 mm. Observations indicate that this species may defend a territory by chasing other birds from it.

REMARKS Though the white-eared catbird is a fairly common, noisy bird in the lower parts of the forest, it is not usually easy to watch.

## Family Neositticidae Australian *Nuthatches*

(*Two species in New Guinea*)

Of the two New Guinea species grouped here, one is peculiar to the mountains of New Guinea, and the other, the sittella, is closely related to the Australian sittellas of the genus *Neositta*. Convention places both species with the nuthatches (genus *Sitta* of the Asia-Europe, North America areas), but it is probable that they are not closely related and the similarities are due to convergence. We place them in a separate family.

The habits of the New Guinea birds are so poorly known that a synopsis of the habits of the Australian sittellas (*Neositta*) is presented. The birds go about in parties of four to a dozen individuals, sometimes more, and behave in a nuthatch (*Sitta*) manner; climbing about branches and trunks of trees, head now up, now down, gleaning for insects and spiders from the bark. They continually give little calls, and the flocks move along quickly. The nest is a beautiful neat cup of animal silk, fur, or wool, placed in an upright fork of a branch and decorated outside with bits of bark and lichens, so that it is extremely

well camouflaged. The eggs, usually three, are greyish white, heavily blotched and spotted. The incubation period has been given as twelve to thirteen days, and the nest life of the young as thirteen to fourteen days. It has been suggested that more than one pair of birds take an interest in a nest.

### Key to *Neosittidae* Species

1 Plumage generally blackish, unstreaked; face pink: *D. miranda*.
2 Body plumage brown and white, streaked; upper tail-coverts white: *N. papuensis*.

### *Daphoenositta miranda* (De Vis)

Pink-faced Nuthatch. Length $4\frac{3}{4}$ in. Adults: generally black, each feather with a grey margin giving an obscurely scaled pattern; forehead, in front of eye, and chin, pink; wing black, with a small white patch near base of primaries white, and inner primaries and secondaries with white area on inner web near middle giving a white band on underside of spread wing; tail black, outer rectrices with pinkish white tips; iris (male) brown, or (female) yellow; bill black; feet (male) blackish green, or (female) yellow. Male wing 87 mm, tail 40 mm, culmen 14 mm, tarsus 19 mm. Female slightly smaller. Immature: much duller and greyer with brown spotting above and below and with rusty brown on forepart of head.

RANGE Mountain forests of New Guinea, from 6,400 to 12,000 ft.

SUBSPECIES Three, moderately differentiated:
a) *frontalis* (van Oort); Snow Mountains.
b) *kuboriensis* (Mayr and Gilliard); mountains of Central Highlands (Kubor and Giluwe Mountains); intermediate between *frontalis* and *miranda*.
c) *miranda* (De Vis); mountains of south-east New Guinea (Mt Tafa and Mt Scratchley); like *frontalis* but with pink on head much less extensive.

REMARKS Though the pink-faced nuthatch has been found only a few times it was fairly common at 7,500 ft on Mt Tafa in south-east New Guinea, where the tall subtropical forests gave way to the lower mossy forest of the higher ridges. The birds were in small flocks of six to ten individuals. These flocks kept together and moved quickly through the forest. Each bird in the flock kept on uttering short calls, the result resembling the sound produced by a flock of finches. The birds usually feed in the smaller branches of the treetops, but sometimes come down into the lower branches and on to the trunks. They behave much like typical nuthatches (*Sitta*), hopping along, head up or head down on

branch or trunk. The food is evidently largely insects, including caterpillars, and a spider was also found in one stomach. A flock sometimes contained birds of both sexes, birds in breeding condition, birds not in breeding condition, and immature birds. Breeding birds were found in May and August despite the fact that October was the beginning of the general breeding season for the forest birds in New Guinea.

***Neositta papuensis* (Schlegel)**

Papuan Sittella. Length 4½ in. Adult male: head and neck (differs greatly with subspecies) being white all round, or black and white all round, or all black above and black and white streaked on chin and throat; rest of plumage, back dark brown streaked with black, upper tail-coverts white; breast and abdomen white coarsely streaked with black and more or less tinged smoky brown on flanks and abdomen; wing quills fuscous with outer under wing-coverts white; tail brownish black, outer rectrices with white tips; iris grey brown or white; fleshy ring around eye yellow; bill pale yellow with black tip; feet pale yellow with black nails; wing 83 mm, tail 39 mm, culmen 15 mm, tarsus 17 mm. Female: like male but head and neck all round white or grey, with or without black shaft streaks on feathers; also whole breast and abdomen may be washed with smoky brown; wing 81 mm. Immature: upperparts dark brown with white spots to the tips of the feathers; underparts whitish, streaked on breast and flanks.

RANGE Mountain forests of New Guinea from 4,800 to 8,700 ft.

SUBSPECIES Four, some strikingly different:

a) *papuensis* (Schlegel); mountains of Vogelkop; male with top of head and neck black.
b) *intermedia* (Junge, 1952); Wissel Lake area in Dutch New Guinea; intermediate between *papuensis* and *alba*.
c) *alba* (Rand); mountains above Idenburg River; male with head and neck all round pure white.
d) *toxopeusi* (Rand); Snow Mountains; male with head and neck all round streaked black and white.
e) *wahgiensis* (Gyldenstolpe); Central Highlands (Mt Hagen, Wahgi area); intermediate between *toxopeusi* and *albifrons*.
f) *albifrons* (Ramsay); south-eastern New Guinea; like *toxopeusi* but male with more black in top of head.

REMARKS Despite the great geographical variation in colour of head, ranging from all white to more than half black, the sittella is easily recognized as a brownish streaked bird with white upper tail-coverts, climbing about in the upper parts of the forest trees searching for insects in the bark. It is usually seen in parties of four to six birds, and though widely distributed seems generally uncommon.

## Family Certhiidae *Tree Creepers*

*(One species in New Guinea)*

The single New Guinea species of this family is a close relative of the Australian tree creepers, being placed in the same genus, *Climacteris*. It is difficult to say whether this genus is closely related to the other genera of tree creepers, which occur in the Philippine Islands, the north temperate zone, and Africa, with which it is customary to group it. However, this need not concern us here and the conventional course is followed. It is sufficient to say that the tree creeper is the only small brownish bird found in New Guinea that makes a habit of climbing up tree trunks.

So little is known of the New Guinea species that it is advisable to present a synopsis of the habits of the Australian species. These birds spend a good deal of time climbing up tree trunks in spiralling or zigzag courses, searching in cracks and crevices for insects. Some species also seem to spend a good deal of time hopping on the ground in the more open forests. The food is entirely small insects. A wide variety of notes uttered is shown by records: these range from silent birds to a characteristic sharp cry, feeble twitterings, a shrill chattering, a staccato call, and low sweet tremulous notes. The nest is placed in a natural hollow of a tree, in the trunk or a branch, and is composed of a wide variety of soft material: bark, plant down, moss, fur, grass, etc. Two or three eggs are laid; pink heavily spotted with red, brown and purple. Both sexes feed the young, at short intervals.

### *Climacteris placens* (Sclater)

Papuan Creeper. Length 5¾ in. Adult male: forecrown dark brown with broken streaks of buff; back brownish olive (greyish olive in subspecies); upper tail-coverts like back or greyer; chin pale buff, breast deeper buff and rest of underparts ochraceous buffy (duller and more greyish buffy in subspecies) obscurely streaked with pale buff and dusky in flanks, and barred with fuscous on under tail-coverts; primaries (except outer) and secondaries with orange-brown mark near middle giving an orange-brown area in closed wing and a band in spread wing; tail with central feathers olive or grey with black subterminal spot, outer tail feathers black with grey tips; iris red-brown; bill black with lower half of mandible whitish; feet dark olive; wing 86 mm, tail 66 mm, culmen 17 mm, tarsus 22 mm. Female: like male but with bright orange area below eye, also duller and with more distinct streaking below; wing 82 mm.

RANGE Mountain forests of New Guinea from 4,400 to 7,700 ft.

SUBSPECIES Four, varying in intensity and shade of colouring:

a) *placens* (Sclater); Vogelkop; a dull olive and greyish buff race with ill-defined stripes on crown.
b) *steini* (Mayr); Weyland Mountains; upperparts dark greyish olive.
c) *inexpectata* (Rand); Snow Mountains; like *steini* but streaks on forehead more sharply defined, and upper tail-coverts clear grey.
d) *meridionalis* (Hartert); mountains of south-east New Guinea and Herzog Mountains; like *inexpectata* but upperparts brownish olive; underparts more ochraceous.

REMARKS The tree creeper was found usually singly or in small parties climbing on the upper parts of the trunks of forest trees, but Gilliard saw one on a tree trunk in the forest within a few feet of the ground. It is usually a scarce bird.

## Family Nectariniidae *Sunbirds*

*(106 species, two species in New Guinea)*

Sunbirds are small active birds found in shrubbery and forest. Their lives centre around flowers into which they probe with their long slender curved bills and tubular tongues for insects and nectar; they may also glean for insects among leaves, twigs and trunks. Most of the 106 species live in Africa, southern Asia and the East Indies, but two species live in New Guinea, and one of these also ranges to Australia. Here they come into competition with honeyeaters, and the two species resemble the *Myzomela* honeyeaters which have similar habits, but they can be distinguished at once by the fact that the male sunbirds have metallic iridescent patches. Both species are lowland birds.

### Key to *Nectarinia* Species

1 Upperparts black, with iridescent areas: *N. sericeus* (male).
Upperparts olive, without iridescence: 2.
2 Throat iridescent green or purple: *N. jugularis* (male).
Throat not iridescent: 3.
3 Head grey, back olive: *N. sericeus* (female).
Crown and back olive: *N. jugularis* (female).

### *Nectarinia jugularis* (Linnaeus)

also known as *Cinnyris jugularis*

Yellow-bellied Sunbird. Length 4½ in. Adult male in breeding plumage: upperparts olive-green; chin to breast metallic blue or green; abdomen bright yellow or black (depending on the subspecies); tail black, outer quills tipped white; iris brown; bill black; feet black; wing 58 mm, tail 40 mm, culmen 23 mm, tarsus 15 mm. Female: similar but with throat yellow; wing 54 mm. Young male like female.

RANGE Southern Asia to northern Australia; in New Guinea widespread in lowlands.

SUBSPECIES IN NEW GUINEA Two very different races:

a) *frenata* (Müller) (*valia* is a synonym); of general distribution (except range of *idenburgi*); abdomen yellow.
b) *idenburgi* (Rand); lowlands of upper Mamberamo River in north New Guinea; abdomen black, upperparts darker than in *frenata*.

NESTING The nest is built in shrub or low tree; an oval, pensile structure with 'porch roof' over a side entrance near the top and a trailing 'tail' below; made of soft fibres and animal silk, lined with feathers; eggs two, bluish white heavily mottled with brownish; size 16·5 × 11·75 mm.

REMARKS The yellow-bellied sunbird is a common bird on the forest edge, in second growth and gardens, and it often comes into villages and settlements. We watched one nest during construction; it was attached to a hanging rope and was on a veranda. The nest was started as a loose strand into which the female, building alone, later forced her way and then added material on the inside as the walls became thin where she forced them out to appropriate size. One bird made twenty-seven trips to the nest with material in twenty-nine minutes; indicative of the sprightly activity of this species.

### *Nectarinia sericeus* (Lesson)

also known as *Cinnyris sericea*

Black Sunbird. Length 4½ in. Adult male: upperparts black; crown iridescent green; scapulars, lower back and upper tail-coverts iridescent blue; tail black edged with green-blue; underparts black, throat iridescent violet; iris brown; bill black; feet black; wing 57–64 mm, tail 37 mm, culmen 22 mm, tarsus 15 mm. Female: head all round grey, paler on throat and upper breast; back olive-green; tail black with small white tips to outer quills; lower breast and abdomen dull yellow; wing 53–55 mm. Immature male like female.

RANGE Celebes and the Moluccas to New Guinea lowlands and Bismarck Archipelago.

SUBSPECIES IN NEW GUINEA Eleven very similar ones:

a) *cochrani* (Stresemann and Paludan); western Papuan Islands (Waigeu, Misol, Salawati).
b) *chlorocephala* (Salvadori); Aru Islands.
c) *sericeus* (Lesson); Geelvink Bay islands of Japen and Kurudu, and New Guinea except range of *vicina*.
d) *vicina* (Mayr); north coast of south-east New Guinea (Huon Gulf to Collingwood Bay).

e) *christianae* (Tristram); south-east Papuan Archipelago (Tagula, Trobriands, Goodenough Islands).
f) *cornelia* (Salvadori); Tarawai Island, north coast of New Guinea.
g) *mysorensis* (Meyer); Biak Island in Geelvink Bay.
h) *maforensis* (Meyer); Numfor Island in Geelvink Bay.
i) *nigriscapularis* (Salvadori); Meos Num and Rani Islands in Geelvink Bay.
j) *salvadorii* (Shelley); small islands in Geelvink Bay?
k) *mariae* (Ripley); Kofiau Island.

NESTING The nest is attached to vine (or twig) thirty feet up (one measured); a neat pensile, oval structure with a projection over entrance near top; composed externally of fine black fibres and flakes of reddish bark; internally of grey fibres. A single pinkish brown egg, heavily marked all over with deep purple.

REMARKS The black sunbird differs from the yellow sunbird in being a true forest bird, though it also feeds on the edges of more open habitats. With quick, active movements this common bird gleans for insects in the upper part of the forest, or descends into forest edge shrubbery, and feeds round flowering trees in company with various small honeyeaters.

## Family Meliphagidae *Honeyeaters*

*(160 species, sixty-five in New Guinea)*

This is one of the largest and most distinctive New Guinea-Australian families with about 160 species, of which sixty-five are found in the New Guinea area. The family ranges east to Bali in the Lesser Sundas (but not to the Greater Sundas, nor Asia), and north to the Bonin Islands of Japan and Hawaii and east to Samoa.

These birds form an important part of the birds in New Guinea that visit flowers for nectar and insects (with parrots and fruit bats), glean foliage, twigs and branches (with warblers), and visit fruit trees (with pigeons and birds of paradise). Their habitat includes savannah, the forest from treetops down to undergrowth, and also the mountain forests up to the timber line. Some birds are noisy with conspicuous calls.

The nest is cup-like or pendant and domed; the eggs spotted; and pair formation is the rule, with the male, sometimes at least, sharing some nest duties.

### *Meliphagidae:* Synopsis of Groups

The New Guinea species are arranged into the following groups which seem more useful than a formal key.

1 TIMELIOPSIS Two species; small to medium size (length $5\frac{3}{8}$–$7\frac{1}{8}$ in.)

with a nearly straight, pointed bill about as long as rest of head; one species tawny brown and fulvous; one with back olive, breast tawny. See Key; p. 528.

2 GLYCICHAERA One species; small (length 4–4¾ in.); bill as long as head, slightly curved; upperparts olive; underparts yellowish; no pattern on side of head; rump and flank feathers long and fluffy; p. 529.

3 OEDISTOMA One species, the smallest honeyeater (length 2⅞ in.); bill as long as head and much curved; tail short; upperparts olive-green; underparts greyish and yellowish; no obvious pattern on side of head; p. 529.

4 MELITHREPTUS One species; small (length 5 in.); bill somewhat shorter than head and slightly curved, underparts all white; back green; top of head and neck black with white crescent on nape. Southern New Guinea, savannah; p. 530.

5 ENTOMYZON One species; large (length 11¾ in.); bill as long as head and somewhat curved; underparts white except for grey throat; back green; top and sides of head and neck black except for white crescent on nape. Southern New Guinea savannah only; p. 530.

6 RAMSAYORNIS One species; small (length 4¼ in.); bill as long as head; upperparts brown; underparts white with scaled pattern on breast. Lowlands; p. 531.

7 CONOPOPHILA One species; small (length 5⅛ in.); bill about as long as head and somewhat curved; back brown; underparts white with wide rufous breast band. Lowladds; p. 532.

8 MYZOMELA Nine species; small (length 3½–5⅝ in.); bill as long as head or somewhat longer and well curved; plumage without green or yellow (except for yellowish tinge to grey-white abdomen in three species), colour varies from all black to all grey-brown to all red, and sometimes combinations of these; males usually with at least some red (the only honeyeaters with red); females usually different and duller, and some without red. Lowlands to high mountains. Key, p. 534.

9 TOXORHAMPHUS Three species; small (length 4¼–5 in.); bill long (somewhat more than length of head to twice length of head); tail short; back green; breast and abdomen yellow or grey; no distinct pattern on side of head. Lowlands and foothills. Key, p. 540.

10 MELILESTES One species; large (length 9 in.); bill long (1¾ × head), well curved; tail square; general colour dark olive-brown, paler below; no wattles or pattern on side of head. Lowlands and foothills; p. 542.

11 MELIPOTES Three species; medium to large (length 8–12¼ in.); bill

stout and short (barely as long as head) and little curved; large area of naked yellow skin about eye; upperparts black or greyish black. High mountains only. Key, p. 542.

12 MELIDECTES Nine species; medium to large (length 9–11¼ in.); bill longer than head and curved; tail rounded with central tail feathers considerably longer than lateral ones; sombre coloured birds, mostly black or grey variegated with some white at least (one species with ochraceous on breast), some species with olive on wings; many species with conspicuous wattles and/or areas of bare coloured skin on head. Mid and high mountains. Key, p. 544.

13 OREORNIS Three species; medium to large (length 7–10¼ in.); bill as long as head and curved; a white or yellow ear patch and a yellow area or line below or behind eye; back feathers olive-green with dusky centres. Key, p. 551.

14 XANTHOTIS Two species; small to medium (length 6¼–8 in.); bill as long as head and curved; a bare area behind eye (covered with white feathers in one subspecies); one species (length 6¼ in.) with ear patch yellow and breast with triangular black spots; one species (length 8 in.) with narrow orange line near ear and plumage generally brown (some subspecies with olive and yellow wash). Key, p. 553.

15 LICHMERA Three species; small (length 5¼–6 in.); bill as long as head and curved; upperparts plain greyish olive-brown or olive; one species breast heavily streaked with white and slate-grey; two species with indistinct white feathers flecking lores or area behind eye. Key, p. 556.

16 MELIPHAGA Eleven species; small to medium (length 4⅞–8¼ in.); bill about as long as head, slightly to moderately curved; green and grey is usual coloration, all with yellow-green or olive edges to remiges and all with conspicuous pattern on side of head. Three groups:

a) one species; small (length 4⅞ in.); side of head yellow with black line: *M. flavescens.*

b) one species; large (length 8 in.); side of head black and yellow; breast whitish with distinct dark stripes: *M. virescens.*

c) nine species; medium (length 5¼–6⅝ in.); upperparts plain olive; underparts grey or greenish grey, obscurely mottled on breast at most; all with contrasting white or yellow patch on ear: *Meliphaga analoga* and allies; p. 558.

17 PTILOPRORA Five species; small to medium (length 5⅞–7¾ in.); bill as long as head or slightly longer, somewhat to well curved; no distinct pattern or naked area on side of head, most species with a streaked pattern in general but obscure in some; colour upperparts

blackish, feathers edged with rufous, grey or olive; underparts predominantly black and grey streaked, or yellow and olive streaked, or grey with little or no streaking. Mid and high mountains. Key, p. 565.

18 PYCNOPYGIUS (three species) and PHILEMON (five species); medium to large (length 7½–13 in.); bill a little longer or shorter than head; tail square; general body plumage brownish or greyish brown, paler below with little or no pattern; however, one species of *Pycnopygius* grey, spotted white below, feathers of back margined olive, otherwise the group without olive; most species of *Philemon* with naked area, sometimes extensive, on head and two species with knob at base of bill; one species of *Pycnopygius* with black, white-striped crown. Lowlands to mid-mountains. Key, p. 569.

**Key to *Timeliopsis* Species**

Larger (length 7⅛ in.); upperparts brown: *T. griseigula.*
Smaller (length 5⅜ in.); upperparts olive-green: *T. fulvigula.*

***Timeliopsis griseigula* (Schlegel)**

Lowland Straight-billed Honeyeater. Length 7⅛ in. Adults: upperparts faded olive-brown; head and neck faintly washed with yellow; upper tail-coverts dull cinnamon-brown; underparts pale ochraceous buff; wings and tail dark brown with exposed edges of quills light brown; iris orange or red; bill dark brown, mandible and base pale; feet flesh-colour. Male wing 95–100 mm, tail 72 mm, culmen 15 mm, tarsus 15 mm. Female wing 90–92 mm.

RANGE Lowland forests of south-east and north-west New Guinea.

SUBSPECIES Two:

a) *griseigula* (Schlegel); Vogelkop and east to Humboldt Bay; male wing 95 mm.
b) *fulviventris* (Ramsay); south-east New Guinea (west in south to Port Moresby, in north to Kumusi River); male wing 100 mm; like *griseigula* but much paler below.

REMARKS A little known species with a strangely fragmented range.

***Timeliopsis fulvigula* (Schlegel)**

Mountain Straight-billed Honeyeater. Length 5⅜ in. Adults: upperparts yellowish olive; underparts pale fulvous buff washed with yellowish olive on sides and abdomen; flight feathers dark brown with green edges; iris red-brown; bill black; feet grey-brown; wing 77 mm, tail 57 mm, culmen 20 mm, tarsus 22 mm.

RANGE The mid-mountains of New Guinea (2,300 to 6,200 ft).

SUBSPECIES Four very similar subspecies:
a) *fulvigula* (Schlegel); Vogelkop (Arfak Mountains).
b) *montana* (Mayr); Weyland to Victor Emanuel Mountains.
c) *meyeri* (Salvadori); mountains of south-east New Guinea.
d) *fuscicapilla* (Mayr); mountains of Huon Peninsula.

REMARKS This is a rare bird. While other honeyeaters are tree birds, this straight-billed species skulks in the forest undergrowth. Wren-like it moves about in the thickets. When alarmed it poses, body horizontal, head stretched out, and tail cocked up. It is shy and darts away at the smallest sound. It favours the vicinity of springs and marshy places in the forest, apparently for the sake of the dense plant growth there. (G. Stein.)

### *Glycichaera fallax* (Salvadori)

White-eyed Honeyeater. Length 4–4¾ in. Adults: upperparts dull greyish olive; underparts pale grey or greyish yellow washed or streaked with olive-grey on chest; flight feathers fuscous edged with olive; wing linings whitish tinged with yellow; iris white; bill dull grey, mandible pale; feet bluish grey. Male wing 59–67 mm, tail 40–50 mm, culmen 15–18 mm, tarsus 18–19 mm.

RANGE North-eastern Australia, New Guinea and its western satellite islands; lowlands up to 3,900 ft.

SUBSPECIES IN NEW GUINEA Four:
a) *pallida* (Stresemann and Paludan); Waigeu Island; underparts greyish not yellowish.
b) *poliocephala* (Salvadori); Aru and Misol Islands and north-west New Guinea (east to Onin Peninsula and head of Geelvink Bay); wing 62 mm, culmen 18 mm; like *pallida* but underparts yellowish.
c) *fallax* (Salvadori); eastern and southern New Guinea (west in north to Huon Peninsula, in south to neck of Vogelkop); like *poliocephala*, underparts paler yellow.
d) *sylvia* (Reichenow); north New Guinea (Japen Island(?) and Idenburg River to Astrolabe Bay); like *fallax* but upperparts darker and bill smaller.

REMARKS The white iris and the lengthened feathers of the rump and flanks are clues to the identity of this plain little honeyeater which seems to spend its time searching for insect food in the foliage and among the twigs of treetops and substage of the forest. It is a scarce bird.

### *Oedistoma pygmaeum* (Salvadori)

Pygmy Honeyeater. Length 2⅞ in. Adult male: upperparts yellowish olive; underparts greyish; the abdomen and flanks washed with

lemon-yellow; chest darker; throat whitish; iris brown; bill black with base of mandible whitish; feet blue-grey; wing 49–51 mm, tail 24 mm, culmen 13 mm, tarsus 14 mm. Female slightly smaller and duller.

RANGE New Guinea and its satellite islands. Lowlands up to 3,750 ft.

SUBSPECIES Three races:

a) subspecies?; Waigeu Island.
b) *pygmaeum* (Salvadori); Misol, and all of New Guinea.
c) *meeki* (Hartert); D'Entrecasteaux Archipelago (Fergusson and Goodenough Islands); like (a) but larger (wing 51 mm), more whitish below, crown grey not green.

REMARKS This pygmy honeyeater is one of the smallest of the New Guinea birds; with a recorded weight of five grams. Though it frequents the under storey trees it also visits the tall flowering trees in the forest where many other honeyeaters and lories feed, and it takes nectar, insects and spiders.

### *Melithreptus albogularis* (Gould)

also known as *M. lunatus*

White-naped Honeyeater. Length 5 in. Adult male: mantle bright yellowish olive-green; top and sides of head and neck black with a white crescent on nape; underparts white; naked orbital skin red-orange; iris red; bill black; wing 75 mm, tail 52 mm, culmen 15 mm, tarsus 17 mm. Female wing 68 mm.

RANGE Northern Australia and southern New Guinea.

SUBSPECIES IN NEW GUINEA One, *albogularis* (Gould); in south New Guinea from Oriomo River to Port Moresby; up to 1,350 ft.

NESTING [Nest cup-shaped, of bark, rootlets and grasses; suspended from fork of sapling thirty feet up; eggs two to three, buff with brownish and grey blotches on larger end; size 21 × 15 mm. Australian data.]

REMARKS Like the giant kingfisher *Dacelo leachi*, this is one of the Australian species which has extended its range not only to the savannahs of south New Guinea but also to those of south-east New Guinea. Here it is found as high as 1,350 ft on the foothills near the Rouna Falls behind Port Moresby.

### *Entomyzon cyanotis* (Latham)

Blue-faced Honeyeater. Length 11¾ in. Adult male: mantle bright yellowish olive; top and sides of head and neck black with a white crescent on nape and an area of naked blue skin about eye; a white streak from base of mandible along sides of throat to breast; chin, throat

and central chest dark grey; rest of underparts white; under wing-coverts blackish; iris grey; bill black, base of mandible pale; feet slate-grey; wing 153 mm, tail 128 mm, culmen 34 mm, tarsus 34 mm. Female: similar but somewhat smaller. Young with the naked face greenish, the crown and nape feathers brownish.

RANGE Australia and southern New Guinea.

SUBSPECIES IN NEW GUINEA One, *harterti* (Robinson and Laverock); in south New Guinea from Merauke district to Wassi Kussa River.

NESTING [Nest of sticks with a cup-shaped egg cavity lined with finer material; placed in or on the dome-shaped nests of the grey-crowned babbler *Pomatostomus temporalis*. Eggs two, pink or buff, sparingly spotted and blotched with browns of varying intensity; size 32 × 24 mm. Australian data.]

REMARKS. The colour pattern of this honeyeater resembles that of the very much smaller white-naped honeyeater which lives in the same savannahs in south New Guinea. Though the blue-faced honeyeater has only been recorded a few times in south New Guinea, it is a fairly common bird in the more open savannahs near the coast. There in the non-breeding season it goes around in noisy wary flocks of from four to six individuals. In Australia it is said to feed at flowers, search for insects among branches and leaves, catch insects on the wing and eat berries.

### *Ramsayornis modestus* (Gray)

Modest Honeyeater. Length 4¼ in. Adults: upperparts dull olive-brown; underparts soiled white with indistinct brown barring on breast and streaking on flanks and abdomen; sides of head brown with small white spot under eye; iris reddish brown; bill and feet pinkish horn-colour. Wing 64 mm, tail 39 mm, culmen 16·5 mm, tarsus 16 mm. Immatures: breast more streaked, less barred and rump coloration more rufous.

RANGE Australia (north Queensland) and most of southern New Guinea and its satellite islands (including Aru Islands, Salawati Island, Batanta Island, Waigeu Island, Goodenough Island, Fergusson Island), but not yet known from large areas of north New Guinea (Mamberamo River to Milne Bay). Usually near sea level.

NESTING The nest is a pensile oval structure with the entrance protected by a slight projection over it, at the side near the top. The nest, which is somewhat loose and untidy in appearance, has the top woven about the twigs from which it hangs and is composed of coarse strips and flakes of teatree bark or swamp mahogany and some animal silk throughout but with no inner lining. The nest is usually near the end of a

branch of a savannah tea tree, sometimes in a swamp tree and is between five and twenty feet up. Sometimes the nests are in loose colonies, one of which had eight nests in an area eighty yards across. Two white eggs, sparingly dotted with blackish; size 18 × 12 mm. Young naked, without down. The female alone builds, accompanied by male; incubation is also by the female but the male helps feed the young.

REMARKS Dry savannah and periodically flooded tea tree swamps are the favourite habitat of the modest honeyeater. There, singly or in small parties, it gleans for insects among the twigs and leaves, especially those in the lower trees. Flowering tea trees always attract this species where numbers may feed in company with the lory *Trichoglossus*, and the honeyeaters *Myzomela obscura* and *Melithreptes albogularis*. When certain trees on the edge of the forest are in flower and attract many birds, the modest honeyeater may be one of them, and a dozen or so sometimes come to a single tree filling the air with their little calls and songs. Where the bird is common it is often heard; it gives low chirping notes and a soft, chattering 'shee-shee-shee . . .'. The song commonly heard is a sharp 'chit', rapidly repeated a number of times.

***Conopophila albogularis* (Gould)**

Rufous-breasted Honeyeater. Length 5⅛ in. Adult male: upperparts dark brown, more grey on forecrown and sides of head and more buffy brown on rump; underparts whitish with a broad cinnamon-brown chest band; throat white; outer edges of wings bright yellow; iris hazel; bill grey-brown, base of mandible paler grey; feet blue-grey; wing 68 mm, tail 45 mm, culmen 16 mm, tarsus 18 mm. Females: often with a narrower chest band and somewhat smaller. Immatures: chest grey, not cinnamon-brown.

RANGE Australia to New Guinea.

SUBSPECIES IN NEW GUINEA One, *mimikae* (Mathews); Aru Islands and lowlands of south New Guinea (Triton Bay to Port Moresby) and north New Guinea (Sepik River).

NESTING The male sings a rather pretty little 'zwee, whit-chi ti' and commonly calls a nasal 'zwee'. The female alone builds the nest, making trips with material at about five-minute intervals. She is accompanied by the male who sits by the nest and sings while she is working on it. One nest was built in five days. The nest is a neat cup slung by its edges from a fork of a low tree or where two bent reeds simulate a fork. The nest is of weathered plant fibre or marsh-grass roots and may be bound with silk; the lining is of rootlets or fine grass. Two white eggs with many red-brown spots and dots, some of which may form a wreath about or cap over the larger end [size 18 × 13 mm, Australian data]. The

young hatch completely naked in about twelve days. Both sexes brood and feed, the latter at the rate of once every seven minutes.

REMARKS The rufous-breasted honeyeater was a common familiar bird in shade and fruit trees at the coastal town of Daru. It gleaned for insects from twigs and leaves, visiting coconut flowers and nesting in orange trees where its grey nests were conspicuous among the green leaves. It seems to be a common bird, but its distribution is limited. In the mid-Fly River marshes it fed not only in the trees edging the lagoons but also among the clumps of tall reeds and even on the stems and leaves of the lotus lilies. Once at Daru, when the leaves of a sour sop tree were wet from a shower, one of these birds bathed by fluttering among the wet leaves, as if in water, and then flew to perch in a mango tree where it shook and preened its wet feathers.

### *Myzomela*

Myzomelas. These small honeyeaters are active birds in the trees. Occasionally we saw a single individual or a pair moving quickly through the lower parts of the forest. Most of the time, however, we saw them gathered at flowering trees. In the savannah, tea-tree blossoms are very attractive to such birds, and in the forest there are a considerable number of trees which they favour. Sometimes one to two hundred honeyeaters and lories consisting of a dozen or more species can be seen feeding, hopping about, darting back and forth in the crown of a single flowering forest giant. This is usually so high that an observer with field glasses on the ground can only rarely identify the species. The only practical way to find out which birds are there is to send a boy up the tree to shoot one of each kind of bird.

Occasionally, on the steep mountain slopes it is possible to look into the crown of a flowering tree growing lower on the slope and see as many as four species of myzomela feeding there, all very similar in behaviour. They hop and flit actively about, probing into the blossoms, and occasionally darting after a passing insect or chasing one another.

Most of the myzomelas seen at these flowering trees are males, and in museum collections males usually greatly outnumber females, even in species in which the sexes are similar. This has led to the speculation that an unbalanced sex ratio exists in nature. However, field experience suggests that males and females have different habitat preferences; the females instead of visiting flowering trees more often feed singly among the foliage, and perhaps lower in the forest.

In the savannahs there is local flowering of tea trees which obviously causes local movements of flower birds and some fruit bats. It may well be that the same is true in the forests. This would correlate the observations of different naturalists; for one can report a species common, and

a later observer at the same place can report it scarce or absent. A study of the relationship between the flowering of trees and the flower-feeding birds awaits study in New Guinea.

Our limited knowledge of the New Guinea species indicates that all the myzomela have similar habits, but some have different habitat and altitudinal preferences.

The males are all easily identifiable, but some of the females are obscure, and the immatures look more or less like the females.

### Key to *Myzomela* Species

1 Underparts with bright red: 2.
Underparts dark brown with dark red wash (Biak Island only): *M. obscura rubrobrunnea* (part).
Underparts with wash of red or rose on chin: 7.
Underparts without red: 6.

2 Underparts all red: *M. cruentata* (male).
Breast red, otherwise underparts black: *M. rosenbergii* (male).
Throat black; breast red; rest of underparts tawny brown: *M. rosenbergii* (female).
Breast brown, grey or whitish; red in throat: 3.

3 Head all round red: 4.
Throat with red; side of head brownish black: 5.

4 Larger (length $4\frac{5}{8}$ in.); underside of body brownish grey: *M. erythrocephala* (male).
Smaller (length $3\frac{1}{2}$ in.); underside of body yellowish white: *M. adolphinae* (male).

5 Small red throat patch; breast dark brown: *M. eques* (male, female).
Chin and throat red; breast yellowish grey (Karkar Island only): *M. sclateri* (male).

6 Underpart all black: *M. nigrita* (male).
Underparts brownish grey, with obscure small dusky throat patch: *M. obscura* (most subspecies) (male, female).
Underparts brownish grey; throat white or with small pink spot (islands east of New Guinea only): *M. albogula* (male, female).

7 The following are the obscurely coloured females of several species. Geography is often the best clue to identity:
Forehead as well as chin washed red: 8.
Forehead not washed with red: 9.

8 Tail washed red: *M. cruentata* (female).
Tail not washed red: *M. nigrita* (female).

9 Length $4\frac{1}{2}$ in.; lowlands New Guinea and Aru Island: *M. erythrocephala.*
Length $3\frac{3}{4}$ in.; mountains New Guinea: *M. adolphinae.*
Length 4 in.; Karkar Island only: *M. sclateri.*

### *Myzomela obscura* (Gould)

Dusky Myzomela. Length 5⅜ in. Adult male: dark brownish grey, underparts paler, often with a faint, dusky central throat streak (one race, Biak Island, washed red); iris brown; bill black; feet blue-grey; wing 68 mm, tail 55 mm, culmen 20 mm, tarsus 17 mm. Female wing 61 mm. Immatures like adults.

RANGE Australia, Aru Island, southern New Guinea, Misol Island, Biak Island and the Moluccan Islands. Sea level up to 300 ft.

SUBSPECIES IN NEW GUINEA Three:

a) *fumata* (Bonaparte); Misol Island and south New Guinea from Seleh on Vogelkop to Kemp Welch River east of Port Moresby.
b) *aruensis* (Kinnear); Aru Islands; like *fumata* but darker, more brownish.
c) *rubrobrunnea* (Meyer); Biak Island; like *aruensis* but strongly washed with brownish blood-red.

NESTING [A frail cup-like structure near end of a branch; eggs two, white with fine spots of brown at larger end; size 15 × 12 mm. Australian data.]

REMARKS This is the dullest species of *Myzomela* to live on the island of New Guinea. It is fairly common in the denser savannahs, on the forest edge and in the mangroves. It also came into the town of Daru and fed at the coconut flowers. The very distinct Biak Island subspecies was recorded by Ripley as a shy nervous bird.

### *Myzomela albigula* (Hartert)

White-chinned Myzomela. Length 5¼ in. Adult male: upperparts solid dark brownish grey, breast similar but more streaked; abdomen and throat paler, the latter with an indistinct ruby stripe (white throat in one subspecies); iris brown; feet blue-slate; wing 73 mm, tail 54 mm, culmen 22 mm, tarsus 20 mm. Female: throat usually ashy white; wing 65 mm.

RANGE Islands of extreme south-east New Guinea.

SUBSPECIES Two distinct ones:

a) *albigula* (Hartert); Rossel Island.
b) *pallidior* (Hartert); western Louisiades (Misima, Deboyne Islands, Conflict group, Bonvouloir Islands); like *albigula* but much paler and with white throat present in both sexes.

### *Myzomela eques* (Lesson)

Red-spot Myzomela. Length 5⅝ in. Adult male: blackish brown, paler, more drab brown below; forehead with faint blood-red spot; central

throat stripe scarlet-red; iris light brown; bill black; feet dark grey; wing 72 mm, tail 56 mm, culmen 24 mm, tarsus 20 mm. Female: much smaller (wing 58 mm); somewhat paler and often lacking red on forehead.

RANGE New Guinea, Rook Island and New Britain; sea level to about 3,000 ft.

SUBSPECIES IN NEW GUINEA Three closely related races:

a) *eques* (Lesson); western New Guinea (Vogelkop and Onin Peninsula) and western islands (Misol, Salawati, Waigeu).
b) *nymanni* (Rothschild and Hartert); east and south New Guinea (west in north to Finschhafen, in south to Mimika River); like *eques* but red of throat more extensive.
c) *primitiva* (Stresemann and Paludan); north New Guinea (head of Geelvink Bay to Astrolabe Bay); like *eques* but darker.

REMARKS Locally this was the commonest honeyeater in certain tall flowering trees in the forest, and there were sometimes twenty to thirty individuals in one tree in company with those of other species. Though four species of myzomela, including this one, sometimes feed in the same flowering tree in the mid-mountains, there is evidence that certain of the trees are not equally attractive to all myzomela. On the lower slopes of the Snow Mountains certain flowering trees contained many more black myzomelas than red-spot myzomelas, and in others the reverse was true.

### *Myzomela erythrocephala* (Gould)

Mangrove Red-headed Myzomela. Length 4⅝ in. Adult male: entire head, throat, rump and upper tail-coverts scarlet red; otherwise blackish brown, becoming greyish on abdomen; iris dark brown; bill black; feet slate; wing 62 mm, tail 44 mm, culmen 20 mm, tarsus 17 mm. Female: paler, with red only as a mask on chin and forehead and slightly smaller.

RANGE Sumba Islands east to New Guinea and northern Australia; sea level.

SUBSPECIES IN NEW GUINEA Two:

a) *erythrocephala* (Gould); Australia (Northern Territory, north Queensland), islands of Torres Strait, and south-east New Guinea (Hall Sound).
b) *infuscata* (Forbes); Aru Islands and south New Guinea (from Triton Bay to mouth of Fly River); like *erythrocephala* but larger and darker.

NESTING [Cup of strips of bark and rootlets, lined with finer material,

suspended in a lateral fork of tree. Eggs two to three, white, spotted and speckled on larger end with brown of various shades; size 15 × 11·5 mm. Australian data.]

REMARKS Quite a few species of birds live in mangrove swamps, but most of them also live in other habitats. There are only two bird species in New Guinea which in our experience, live only in the mangrove swamps by the coast, and in no other habitat. One is a flycatcher and the other is this myzomela which is common in its special niche.

### *Myzomela adolphinae* (Salvadori)

Mountain Red-headed Myzomela. Length 3½ in. Adult male: entire head, throat, rump and upper tail-coverts scarlet red, otherwise upperparts blackish; underparts greyish washed with citrine, darker on breast; lores blackish; wing linings white; iris dark brown; feet greenish slate; bill black; wing 51 mm, tail 34 mm, culmen 14 mm, tarsus 14 mm. Female: olive above with red only as a wash on forehead, chin and under eyes.

RANGE Known only from the mid-mountain areas of western New Guinea (Arfak), north-eastern New Guinea (Saruwaged, Kubor, Bismarck and Hagen Mountains) and eastern New Guinea (Herzog Mountains and the mountains of south-east New Guinea); 2,700 to 6,000 ft.

REMARKS In general this, the smallest of the New Guinea myzomelas, is an uncommon mid-mountain forest bird. In the Wahgi region of the Central Highlands, however, Gilliard found it common in flowering trees on the forest edge and in gardens during April and May, 1950. The next year in September and October, Gyldenstolpe found the species very scarce in the same district and the few he saw were in rather open brushy country adjoining the mid-mountain grasslands. This suggests local seasonal movements.

The similarity in colour and pattern between this species and the much larger mangrove red-headed myzomela of the coast is remarkable.

### *Myzomela sclateri* (Forbes)

Sclater's Myzomela. Length 4¼ in. Adult male: upperparts and face dark brownish olive; throat scarlet-red; remaining underparts pale greyish washed with citrine, darker on breast; wing linings white; iris dark brown; feet slate-grey; bill black; wing 62 mm, tail 40 mm, culmen 17 mm, tarsus 18 mm. Female: smaller (wing 56 mm), paler and with only a trace of red on chin.

RANGE Small islands off northern New Guinea (Karkar Island) and New Britain (Long Island, Umboi Islands, Talele Islands, Vuatam Islands, Nanuka, Creder Islands).

***Myzomela cruentata* (Meyer)**

Red Myzomela. Length 4¼ in. Adult male: rich scarlet-red; underparts lighter; wings sooty brown narrowly edged with olive; tail dark brown washed with red; iris brown; bill brownish black; feet brownish grey; wing 56 mm, tail 40 mm, culmen 17 mm, tarsus 14 mm. Female: smaller (wing 53 mm) and more drab; upperparts dark olive-brown washed lightly with rose-red on forehead, rump and tail; underparts olive-grey, paler on midline of belly and washed with rose on chin. Young male like female but with vivid patches of red.

RANGE Bismarck Archipelago and New Guinea, usually in mid-mountain forest, 1,800–4,800 ft.

SUBSPECIES IN NEW GUINEA One, *cruentata* (Meyer).

REMARKS The male of this species is red in colour, but it is a rather dull, dilute red compared with the vivid red in the plumage of the red and black myzomela. In certain mid-mountain localities this species was common in flowering trees, but it was rarely seen elsewhere. At one place where eight males were collected only two of the olive and grey females were found.

***Myzomela nigrita* (Gray)**

Black Honeyeater. Length 4⅞ in. Adult male: solid black (one subspecies with red cap); wing linings white; iris brown; bill black; feet grey tinged with yellow; wing 64 mm, tail 46 mm, culmen 19 mm, tarsus 16 mm. Female: paler, more sooty olive-grey with a rose chin and forehead; or occasionally black, like the male but duller; wing 51 mm.

RANGE New Guinea and its satellite islands, islands of the Bismarck Archipelago and Solomon Islands; sea level to 3,900 ft, but most common between 1,800 and 3,000 ft.

SUBSPECIES IN NEW GUINEA Six, most of them very similar:

a) *steini* (Stresemann and Paludan); Waigeu Island.
b) *nigrita* (Gray); Aru Islands and south New Guinea (between Fly and Eilanden Rivers); females black or grey.
c) *meyeri* (Salvadori); Japen Island and New Guinea exclusive of range of *nigrita*; a slightly larger race.
d) *pluto* (Forbes); Meos Num Island, Geelvink Bay.
e) *louisiadensis* (Hartert); Louisiade Archipelago (Woodlark, Misima, Sudest).
f) *forbesi* (Ramsay); D'Entrecasteaux Archipelago (Fergusson, Goodenough, Dobu Islands); differs from the rest by presence of red cap in male.

REMARKS Though in most of New Guinea proper this black myzomela

is a mid-mountain forest bird, in south New Guinea where the females are dimorphic being either grey or black like the male, the species is common at sea level as it is on some smaller islands.

### *Myzomela rosenbergii* (Schlegel)

Black and Red Honeyeater. Length 4⅝ in. Adult male: neck all round, breast, back and rump glossy scarlet-red; rest of plumage black; iris brown; bill black; feet greyish black; wing 64–69 mm, tail 42 mm, culmen 20 mm (in subspecies to 24 mm), tarsus 16 mm. Female: upperparts dark sepia-brown with pale cinnamon striping; rump and lower throat scarlet red; lores and chin blackish; chest and abdomen dull tawny brown; wing linings white.

RANGE New Guinea and Goodenough Island, from about 3,700 to 11,000 ft.

SUBSPECIES Three:

a) *rosenbergii* (Schlegel); Arfak Mountains.
b) *wahgiensis* (Gyldenstolpe); mountains of New Guinea exclusive of Vogelkop; very like *rosenbergii*.
c) *longirostris* (Mayr and Rand); mountains of Goodenough Island, D'Entrecasteaux Archipelago; like *rosenbergii* but larger and bill much longer; wing 69 mm, culmen 24 mm.

NESTING A rather bulky, cup-shaped nest is made composed of roots and lined with rootlets and resting in a fork of a shrub ten feet up. Two young in one nest, fed by female only.

REMARKS The male is the only brilliantly black and red honeyeater, the only myzomela at high altitudes, and the only species of its genus which is generally common and conspicuous in its range. As many as a dozen individuals were seen feeding in a single tall tree, and at one place, where the birds were feeding at blossoms in the substage, females were more common than is usual. On one occasion in the Snow Mountains a single male was seen far above the timber line at about 13,000 ft on a talus slope where only a few low, isolated shrubs were growing. The black and red skins of this bird are used for ear ornaments by Papuans living at high altitudes in south-east New Guinea, the head of the skin being thrust through a hole in the lobe of the ear.

### *Toxorhamphus*

Longbill, seems an appropriate name for the three long-billed, short-tailed species which form this genus. Unlike most honeyeaters the longbills' favourite habitat is in the lower parts of the forest and the undergrowth, where the birds hop and flit about with quick active movements searching for insects on the leaves, twigs, and even at times on the bark of the tree trunks. They are usually seen alone or in pairs

when short chases are frequent. Their notes are usually sharp and distinctive, little calls often repeated which we recorded as 'chi . . .', 'ti-ti ti . . .', and 'ge ge ge . . .', a throaty, two-syllable call, and a short trill.

Sometimes however, the longbills go into the higher trees and tree-tops and visit those in flower in company with other flower birds. When gleaning insects from foliage and twigs the longbills sometimes join the mixed flocks of insectivorous birds moving through the forest. This is a composite of notes on the three species, and specific differences in behaviour may be found between the three kinds.

The preferences of the longbills for forest undergrowth resemble the habitat preferences of the straight-billed honeyeaters; though the general proportions of the two are quite different, and the longbills are not shy and retiring.

**Key to *Toxorhamphus* Species**

Underparts greenish grey: *T. iliolophus.*
Underparts yellowish green: *T. novaeguineae.*
Upper throat slate, lower throat yellow, breast green: *T. poliopterus.*

***Toxorhamphus novaeguineae* (Lesson)**

Yellow-bellied Longbill. Length $4\frac{7}{8}$ in. Adult male: upperparts yellowish olive-green; underparts citrine-yellow washed with olive on breast; a narrow whitish eye-ring; iris brown; bill blackish; feet blue-grey; wing 70 mm, tail 38 mm, culmen 34 mm, tarsus 16 mm. Female: smaller; wing 60 mm, culmen 26 mm.

RANGE Aru Islands, western Papuan Islands, Japen Island and New Guinea (except eastern peninsular areas); sea level to 3,600 ft.

SUBSPECIES Two:

a) *novaeguineae* (Lesson); western Papuan Islands (Misol, Salawati, Batanta, Waigeu), islands of Geelvink Bay (Japen) and western New Guinea (in north east to Astrolabe Bay and upper Ramu River, in south to Etna Bay).
b) *flaviventris* (Rothschild and Hartert); Aru Islands and south New Guinea (between Utakwa and middle Fly Rivers); like *novaeguineae* but more yellowish, less olivaceous below.

***Toxorhamphus iliolophus* (Salvadori)**

Grey-bellied Longbill. Length $4\frac{1}{4}$ in. Adult male: upperparts dark olive-green; underparts olive-grey washed with yellow on flanks; iris dark chestnut; feet slate-blue; bill black with a lemon-yellow base; narrow eye-ring yellow; wing 64–72 mm, tail 34 mm, culmen 20 mm, tarsus 19 mm. Female similar. Size varies with subspecies.

RANGE Western satellite islands, islands of Geelvink Bay, New Guinea and the D'Entrecasteaux Archipelago; from about 300 to 4,800 ft.

SUBSPECIES Five, all very similar:

a) *cinerascens* (Stresemann and Paludan); Waigeu Island; crown grey not dark olive-green.
b) *affinis* (Salvadori); mountains of Vogelkop (Arfak, Tamrau); crown olive-green.
c) *iliolophus* (Salvadori); islands of Geelvink Bay (Japen, Meos Num), north and central New Guinea (from Geelvink Bay to Huon Peninsula, including central mountains: Weyland to Victor Emanuel and Sepik Mountains); like *affinis* but slightly larger.
d) *flavus* (Mayr and Rand); south and south-east New Guinea near sea level; like *affinis* but with underparts more yellowish.
e) *fergussonis* (Hartert); D'Entrecasteaux Archipelago (Fergusson, Goodenough and Normanby Islands); larger than all above; male wing 72 mm.

NESTING A cup of dried grass is attached to a twig and its leaves, the outside is covered with half-decayed dry leaves, the inside thickly lined with very soft, snow-white vegetable silk. A single creamy white egg with pale reddish spots generally distributed, a ring of brownish red spots around larger end and a few deep brown hair-lines around the middle; size 20 × 14 mm. (Rothschild and Hartert.)

### *Toxorhamphus poliopterus* (Sharpe)

Slaty-chinned Longbill. Length 5 in. Adult male: upperparts dark olive-green; head and nape dark grey; underparts pale yellowish olive with a prominent pale yellow spot on the lower throat; chin and upper throat slaty grey; wings and tail dark grey; tail tipped with white; iris dark brown; bill black; feet slate-blue; wing 68 mm, tail 39 mm, culmen 32 mm, tarsus 15 mm. Female like male but smaller and paler; wing 60 mm, culmen 29 mm.

RANGE Mountains of New Guinea exclusive of the Vogelkop; 1,200 to 6,600 ft.

SUBSPECIES Three similar ones:

a) *poliopterus* (Sharpe); south-eastern New Guinea.
b) *septentrionalis* (Mayr and Rand); mountains of the Huon Peninsula (Saruwaged Mountains), and Central Highlands.
c) *maximus* (Rand); north slope of Weyland and Snow Mountains.

NESTING A cup of fine greenish vegetation is firmly attached to a crotch of a small sapling six feet up over a brook in the forest. A single white egg.

REMARKS In addition to the habits given under the genus heading, we found that in the Central Highlands this species was fairly common on the forest edge and in the spaced out trees in the mid-mountain grasslands.

### *Melilestes megarhynchus* (Gray)

Long-billed Honeyeater. Length 9 in. Adult male: upperparts olive-brown, the head with blackish striping; underparts buffy brown, the abdomen brighter, the throat paler with indistinct striping; wing lining ochraceous brown; iris reddish buff; bill blackish; feet slate-grey; wing 102 mm, tail 85 mm, culmen 43 mm, tarsus 27 mm. Female: paler and smaller; wing 92 mm. Immatures: paler below, striped with dark brown, and with the eye-ring whitish or pale yellow.

RANGE New Guinea and satellite islands (Misol, Waigeu, Salawati, Japen and Aru); lowlands to 4,800 ft.

SUBSPECIES Four all very similar:

a) *megarhynchus* (Gray); Aru Islands, Western Islands (Misol, Salawati) and New Guinea except the north of the island.
b) subspecies?; Arfak Mountains.
c) *stresemanni* (Hartert); Japen Island and northern New Guinea (between Mamberamo River and Astrolabe Bay).
d) *vagans* (Bernstein); Waigeu Island.

REMARKS The length of the bill in this species resembles the condition in the much smaller, olive-coloured longbills of the genus *Toxorhamphus*. There is a certain similarity in habits, too, for some of the time this large long-billed bird climbs and hops about in the heavily shaded undergrowth, apparently gleaning for insects from the foliage, twigs, and smaller trunks. This species also goes into the treetops and visits flowering trees. Many individuals have the feathers of the forehead caked with pollen. Unlike the smaller honeyeaters, this bird is rather slow, even sluggish in its movements, but the occasional spirited chase of one bird by another is a common event.

### *Melipotes*

The members of this genus are unique among New Guinea honeyeaters as they specialize in eating berries, and correlated with this habit, the bill is short and the tongue is not brush-tipped. The three species are geographical representatives but they are different enough to justify division into species. Presumably they all have similar habits.

#### Key to *Melipotes* Species

Lower breast black with sharply defined triangular pale areas in tips of feathers; Arfak only: *M. gymnops*.

Lower breast slaty with obscurely pale edges to feathers: *M. fumigatus*. Breast black with distinct white tips to feathers; Huon Peninsula only: *M. ater*.

***Melipotes gymnops* (Sclater)**

Arfak Melipotes. Length 8½ in. Adult male: sides of head naked and orange-yellow; crown and mantle blackish brown, paler on wings; outer edges of flight feathers tinged with yellowish olive; underparts blackish brown, more greyish on abdomen, where feathers are broadly tipped with triangular cream-coloured spots; wing lining and under tail-coverts ochraceous brown; iris brown; bill black; feet blue-grey; wing 118 mm, tail 98 mm, culmen 25 mm, tarsus 32 mm. Female wing 111 mm.

RANGE Known only from the mountains of the Vogelkop and from Mt Wondiwoi on the Wandammen Peninsula; mountain forest from 3,660 to 6,000 ft.

***Melipotes fumigatus* (Meyer)**

Common Melipotes. Length 8½ in. Adults: naked face (encircling eye) and ear-wattle orange-yellow; upperparts blackish brown; underparts dark greyish brown, paler on throat and abdomen; wing linings, lower abdomen and under tail-coverts tinged with buffy brown; iris dark brown; bill blackish; feet sooty grey. Male wing 106 mm (one race to 128 mm), tail 105 mm, culmen 24 mm, tarsus 31 mm. Female wing 102 mm.

RANGE Mountain forests of New Guinea exclusive of the Vogelkop and Huon Peninsula, from 4,200 to 9,000 ft.

SUBSPECIES Two:

a) *goliathi* (Rothschild and Hartert); mountains of the main body of New Guinea (Weyland, east to Central Highlands); large, male wing 117 mm, and dark.

b) *fumigatus* (Meyer); mountains of south-eastern New Guinea (including Herzog Mountains); like *goliathi* but smaller and paler.

NESTING Gilliard made some observations which suggest courtship activities. One was of a female hopping excitedly from side to side on a thin horizontal perch eighty feet up in the crown of a forest tree in such a manner as to resemble a bird of paradise. The other was of a bird hanging head down for a few moments while its yellow face turned brownish red, presumably from the rush of blood to the head. After the bird turned the right way up again, the face gradually returned to its normal yellow. The nest is a cup-shaped structure, semi-pensile with its edges woven about the sides of a flat fork near the end of a branch of a

second-storey tree, from fifteen to twenty-five feet up. The nest is a rather bulky, loose affair of mossy plants and long black fibres helping to bind it together; lined with dead leaves and fern, making a rather hard, rough lining. A single pink egg with red-brown spots more plentiful towards the larger end. Only one of the adults feeds the young and this at rather long intervals; giving it berries.

REMARKS The melipotes is a common species and is typically a bird of the mountain forest substage. It is usually found alone or in pairs. It seems a placid, slow-moving bird, rarely uttering a sound. Its usual food is small fruits swallowed whole, but occasionally the pulp only of a larger fruit is eaten. The bird rarely goes into a flowering tree, and one bird that was watched pecking placidly at such blooms was found to have its stomach crammed with nothing but insects, presumably those attracted to the flowers. Another bird was seen to drink from a hole in the water-filled bulbous base of the woody, epiphytic ant-plant, and then to move about among the foliage as though searching for insects.

***Melipotes ater* (Rothschild and Hartert)**

Huon Melipotes. Length 12¼ in. Adults: naked sides of head, sub-loral and auricular wattles orange in colour; upperparts solid black; underparts black with bold white tips to the feathers; throat dull grey; bill black. Male wing 157 mm, tail 154 mm, culmen 29 mm, tarsus 42 mm. Female wing 143 mm.

RANGE Huon Peninsula in mountain forest from 3,900 to 9,000 ft.

***Melidectes***

The large, mostly dull-coloured species of this genus are mid-mountain and high-mountain birds.

**Key to *Melidectes* Species**

1 Plumage generally black, with or without white on throat: 2.
Plumage only partly black at most, or mostly grey: 3.

2 Throat black, without white: *M. fuscus.*
Throat with very elongate, narrow white plumes: *M. princeps.*
Throat with somewhat elongate, broad white plumes: *M. nouhuysi.*

3 Lower throat white, breast band black, lower breast ochraceous: *M. torquatus.*
No ochraceous on breast: 4.

4 No conspicuous wattles: *M. belfordi.*
Conspicuous throat and gape wattle: 5.

5 Forehead broadly white, superciliary white, breast black: *M. leucostephes.*
Forehead broadly white, superciliary yellow, breast grey: *M. rufocrissalis.*

Forehead with small median spot of white, rudimentary white superciliary, breast sooty grey: *M. foersteri.*
Forehead black, superciliary ochraceous: *M. ochromelas.*

***Melidectes fuscus* (De Vis)**
Sooty Honeyeater. Length 9⅜ in. Adult male: wattle and naked area behind eye pale bluish with a yellow centre (south-east New Guinea) or ivory with a brick-red spot (Mt Hagen); plumage sooty blackish with fine sooty grey edgings; under tail-coverts tinged lightly with brown; iris dark brown; bill black; feet bluish grey; wing 106 mm, tail 110 mm, culmen 35 mm, tarsus 34 mm. Female: smaller, and with smaller wattles; wing 99 mm.

RANGE High mountains of New Guinea exclusive of the Vogelkop and Huon Peninsulas, from 5,600 to 11,500 ft.

SUBSPECIES Two or three moderately differentiated ones:
a) *fuscus* (De Vis); mountains of south-eastern New Guinea.
b) subspecies?; Central Highlands.
c) *occidentalis* (Junge); Snow Mountains; like *fuscus* but smaller.

NESTING The nest is a cup of fine rootlets and moss, lined with red fibres from the tree-fern, placed in a branch of a tree; one young in one nest; both sexes feed young on insects and perhaps nectar (Shaw-Meyer).

REMARKS In eastern New Guinea the sooty honeyeater was fairly common, in the higher mountain forests up to the timber line. It frequents both the tops of the trees and the lower parts of the forest. Much of its food seems to come from the twigs and foliage, through which it gleans for insects. In the Snow Mountains very few birds have been recorded.

***Melidectes princeps* (Mayr and Gilliard)**
Long-bearded Honeyeater. Length 10½ in. Adult male: blackish; bare area below eye ivory, and behind eye yellowish orange; chin and throat white, the throat with long white 'whiskers'; central abdomen with traces of white tipping; under tail-coverts edged with buffy brown; tail with indistinct white tipping; iris dark reddish brown; bill black; feet blue-grey; wing 118 mm, tail 114 mm, culmen 47 mm, tarsus 37 mm. Female wing 114 mm. Young have the white throat feathering washed with amber-yellow.

RANGE High mountains of the Central Highlands, between 10,500 and 12,500 ft.

REMARKS The long-bearded honeyeater is fairly common in the mossy

woodlands near the treeline and in the scattered clumps of brush in the alpine grassland of the Central Highlands. It is a geographical representative of the short-bearded honeyeater of the Snow Mountains, with similar habits. Strangely enough, it has no representative in the mountains of south-eastern New Guinea. Perhaps the annual burning of the alpine grasslands there, which has destroyed the alpine shrubbery and has eaten into the forest, artificially lowering the timber line, is responsible.

***Melidectes nouhuysi* (van Oort)**

Short-bearded Honeyeater. Length 10¾ in. Adult male: upperparts sooty black; bare area behind eye chrome-yellow; chin and throat white; the lateral feathering somewhat lengthened; underparts sooty black; feathers of centre of abdomen tipped with white; lower abdomen more brownish; under tail-coverts broadly edged with buffy white; tail feathers with indistinct white tips; iris dark; bill black; feet brownish black; wing 141 mm, tail 132·5 mm, culmen 34 mm, tarsus 43 mm. Female wing 125 mm. Subadults: throat washed with yellow and feathers of the abdomen less heavily tipped with white.

RANGE Snow Mountains; on Mt Wilhelmina from 10,000 to 13,000 ft.

NESTING The nest is a loose, bulky, cup-shaped structure placed about four feet up in a multiple fork of a rather isolated shrub and well concealed by the surrounding foliage; composed of mosses, liverworts and thread-like fungi with an inner firmer cup scantily lined with grass, stems and other soft vegetable material and feathers. A single pink egg marked with spots and dots of brownish more plentifully in a wreath about the larger end; size 31 × 20 mm.

REMARKS The short-bearded honeyeater was the most common bird at and above the timber line in the Snow Mountains. It lived on the forest edge and in the scattered clumps of trees and bushes of the alpine grassland. Its downward range was stopped by the closed forest into which it did not venture; its upward limit by the last outposts of scattered shrubs straggling up a gully or in the shelter of a rock. The bird is secretive but not shy. It spends a good deal of time on the ground under the shrubbery where it picks over the leaf litter and hops through the densely spaced branches of the thickets, flying with jerky flight from one clump of shrubbery to the next, and occasionally going up into a tree.

As is common with high altitude species which live in a more rigorous environment than is found at a lower level, the diet of this bird is varied and consists of the fruits of trees and shrubs, sedge seeds, and insects.

***Melidectes ochromelas* (Meyer)**

Mid-mountain Melidectes. Length 9¾ in. Adults: upperparts generally greyish olive-brown, but the feathers of the upper back with buffy or white tips, those of the central back with contrasting white tips; crown blackish; a narrow superciliary stripe and tips of ear-coverts pale cinnamon; sides of head below naked skin around eye blackish tinged with grey; outer edges of wing and tail quills yellowish green; underparts blackish brown with feathers of abdomen tipped buffy; wing linings and under tail-coverts edged with buff; iris brown; feet pale blue-slate; bill pale blue-slate; skin around eye greenish white to yellowish; throat wattles orange-red; wattles at angle of mouth yellow. Male wing 130 mm, tail 116 mm, culmen 38 mm, tarsus 31 mm. Female wing 118 mm.

RANGE Mountains of New Guinea from Vogelkop to south-east New Guinea, from 5,000 to 6,500 ft.

SUBSPECIES Three quite similar ones:

a) *ochromelas* (Meyer); mountains of the Vogelkop and Mt Wondiwoi.
b) *batesi* (Sharpe); mountains of western (Weyland and Nassau Mountains) and south-eastern New Guinea; like *ochromelas* but superciliary line more pronounced and grey in breast less pronounced.
c) *lucifer* (Mayr); mountains of Huon Peninsula; like *batesi* but darker on breast and head.

REMARKS Despite its extensive range in the different mid-mountain areas of New Guinea, this seems to be one of the rare honeyeaters and is of local occurrence. Presumably it is a forest bird. We have no experience of the live bird.

***Melidectes leucostephes* (Meyer)**

White-fronted Melidectes. Length 10¼ in. Adults: broad naked areas above, below and behind eye pale whitish to pale blue; prominent throat wattles dark brick-red or orange-yellow; upperparts dark brown, the feathers of the back broadly tipped with buffy white; wing quills edged with yellow-olive; crown, lores, ear-coverts and throat blackish; forehead, superciliaries, line under eye, posterior ear-coverts and basal portions of breast feathers white; underparts blackish brown with feathers of abdomen and under tail-coverts broadly tipped white; iris dark; bill whitish grey; feet blue-grey. Male wing 136 mm, tail 114 mm, culmen 43 mm, tarsus 35 mm. Female wing 122 mm.

RANGE Known only from the mountains of the Vogelkop, from 3,000 to 5,400 ft.

REMARKS This and the following three forms represent a series of

geographical representatives on which opinion is divided as to the number of species concerned. Where two of them meet in central New Guinea, a curious zone of hybridization occurs. Other than here no two occur in the same area, and the forms differ from each other as much as do some other species in the genus. We prefer to call them all species. (See Gilliard (1959), *American Museum Novitates*, No. 1937.)

The Arfak bird lives in the forest edge of the mid-mountain grasslands and is quite isolated from its nearest relatives.

***Melidectes belfordi* (De Vis)**

Belford's Melidectes. Length 10¾ in. Adults: naked skin on face and at base of bill light cerulean blue; gape wattles white with traces of yellow; throat wattles present only in hybrid populations; above sooty brownish black (or olivaceous) indistinctly edged with sooty grey on back; crown, lores, sides of head and throat black; superciliary stripe, longer ear-coverts and broad streaks at sides of throat white; below grey with pale grey tipping; abdomen and under tail-coverts cinnamon-brown; iris dark reddish brown; bill dark greyish black or pale grey; feet light blue-grey. Male wing 152 mm (some only up to 142 mm), tail 133 mm, culmen 44 mm, tarsus 36 mm. Female wing 140 mm (some subspecies only up to 130 mm).

RANGE Widespread in the mountains of the main body of New Guinea and eastern New Guinea, from 5,000 to 11,500 ft.

SUBSPECIES Six:

a) *joiceyi* (Rothschild); Weyland Mountains; back olivaceous.
b) *kinneari* (Mayr); Nassau Mountains and the western Oranje Mountains (upper Noord River); back grey with an olive wash.
c) *griseirostris* (Rothschild and Hartert); Mt Goliath and the eastern Oranje Mountains; like *kinneari* but bill pale grey, not blackish, and with throat as well as gape wattles; a population of hybrid origin, *belfordi* × *rufocrissalis*.
d) *belfordi* (De Vis); Victor Emanuel Mountains above 7,000 ft, and mountains of south-eastern New Guinea (alpine forest above 11,000 ft); like *griseirostris* but back dull grey; male wing 150 mm, female wing 140 mm.
e) *brassi* (Mayr and Rand); mountains of south-eastern New Guinea (mid-mountain forests between 4,800 and 8,400 ft); like *belfordi* but smaller; male wing 142 mm, female wing 131 mm.
f) *stresemanni* (Mayr); Herzog Mountains; a variable population of hybrid origin between *belfordi* and *rufocrissalis*.

Narrow altitudinal belts containing hybrids between *M. belfordi* and *M. rufocrissalis* occur in central New Guinea (Mittag Mountains), in the

Wahgi region (Giluwe, Hagen, Kubor Mountains, Wahgi Divide Mountains, Bismarck Mountains). Gilliard presents evidence to show that these two groups are not conspecific, despite their infertility under conditions of habitat disturbance. According to him, *M. rufocrissalis* is essentially a forest edge bird of the northern watershed and *M. belfordi* is essentially a pure forest species of the main ranges. These morphologically very different species, he believes, were brought into hybrid contact by the removal of mid-mountain valley forests by primitive man. These points of contact, the belts, occur only in the artificial forest edges which are today located in areas formerly solidly forested. In undisturbed areas the two groups apparently live side by side without hybridizing.

NESTING A deep cup nest of moss and a few twigs is made, with a dense lining of the very soft golden-brown material from the base of tree-fern fronds; sometimes fine grass and fern stalks are added; placed in the fork of a branch of a tree, from eight to twenty feet up. Eggs not described, but one young recorded. Both parents feed the young on insects and perhaps nectar.

REMARKS This species, usually black-billed, is a bird of the high mountain forests and is common up to the timber line. In the Wharton Range, once its range is reached, 6,500 ft and above, it is a common, noisy and very obvious species. It is a bird found in the treetops and it favours the flowering trees, feeding on the insects attracted there, and also, perhaps, on nectar. It is rather deliberate in actions, and one, clinging upside down to a bunch of flowers, systematically probed all within reach. Occasionally it visits fruiting trees and eats the fruit. These birds do not gather in numbers around flowering trees, but rather one or two birds take possession of a tree and drive away, not only others of their own kind, but also birds of other species. The flight is like that of some other large honeyeaters, starting from a perch with heavy wing flapping and then a glide with forward stretching wings to reach another perch.

Sometimes these birds are especially noisy during a rainstorm. The variety of calls is considerable. Some of these were recorded as: a loud, high 'kee kee . . .'; a hoarse 'que que . . .'; a sharp whistled call of alarm repeated several times; a loud 'whit whit . . .'; a soft 'cremm . . .'; a loud clear 'pit pit . . .', but this by no means exhausts the repertoire.

This is one of the New Guinea species in which size increases with altitude. In the Snow Mountains, males from 6,000 ft altitude have wings measuring 133–44 mm, those from 11,500 ft, wings measuring 144–50 mm.

***Melidectes rufocrissalis* (Reichenow)**

Reichenow's Melidectes. Length 10¼ in. Adults: naked skin on face pale whitish yellow; gape wattles very pale greenish white; throat wattles deep orange; above blackish brown, feathers edged with grey-white on back and washed with brown on rump; crown, lores, sides of head and throat black; forehead, narrow stripe at sides of throat white; superciliary stripe, ear-coverts yellow; below dark grey with much pale grey tipping, particularly on central abdomen; under tail-coverts chestnut-brown; iris dark brown; bill pale grey-blue; feet whitish grey. Male wing 135 mm, tail 107 mm, culmen 46 mm, tarsus 35 mm. Female wing 123 mm.

RANGE Central New Guinea in the Schraderberg and Hindenburg Mountains, 5,000 to 7,000 ft.

REMARKS This species is primarily a bird of the forest edge and scattered trees of the mid-mountain grasslands. It hybridizes extensively in certain areas with *M. belfordi*, which is a higher ranging forest bird in such areas (see under *M. belfordi*).

***Melidectes foersteri* (Rothschild and Hartert)**

Foerster's Melidectes. Length 11¼ in. Adults: naked skin on face pale blue; gape wattles red?; throat wattles red; upperparts brownish black with feathers conspicuously edged with grey-white on upper back, and indistinctly on lower back; crown, lores, sides of head and throat black; midline of forehead and forecrown, narrow superciliaries, line under eye, ear-coverts and narrow stripe at sides of throat white; below blackish grey with prominent pale whitish tips on feathers of lower breast, central abdomen mostly whitish and under tail-coverts pale cinnamon. Male wing 170 mm, tail 144 mm, culmen 35 mm, tarsus 42 mm. Female wing 148 mm.

RANGE Saruwaged Mountains of Huon Peninsula, from 6,000 to 10,200 ft.

REMARKS The mountain forest range of this species is quite isolated from that of its nearest relatives.

***Melidectes torquatus* (Sclater)**

Cinnamon-breasted Wattle Bird. Length 9 in. Adults: naked facial skin apricot-yellow; gape wattle reddish orange; upperparts blackish brown with vivid white edgings on upper back; lower back and hind neck more sooty brown; crown, lores, sides of head, upper throat, upper breast and bold barring and spotting on sides of breast and abdomen black; lower throat white; superciliary, sides of neck, lower breast and wing linings rich cinnamon-buff; abdomen and under tail-coverts pale buffy white with indistinct dark feather centres; iris brown; bill grey

with a greenish wash at base; feet dark grey. Male wing 111–21 mm, tail 106 mm, culmen 30 mm, tarsus 28 mm. Female wing 100 mm.

RANGE The mid-mountain altitudes of New Guinea, including those of Vogelkop, Huon Peninsula and south-eastern New Guinea.

SUBSPECIES Six similar ones:

a) *torquatus* (Sclater); mountains of the Vogelkop (2,400 to 4,800 ft); no throat wattles; wing 115 mm.
b) *nuchalis* (Mayr); mountains of western New Guinea (Weyland, Nassau, Oranje Mountains on upper Mamberamo); like *torquatus* but breast more tawny and upperparts darker; wing 115 mm.
c) *mixtus* (Rand); Balim region of the Snow Mountains (4,800 to 6,600 ft); like *nuchalis* but larger, darker, less ochraceous in nape, white throat patch larger, and white edgings on back more conspicuous; male wing 121 mm; throat wattle sometimes absent.
d) *cahni* (Mertens); mountains of the Huon Peninsula (3,000 to 5,100 ft); like *mixtus* but deeper tawny below and throat wattle present though small; size smaller, wing 117 mm.
e) *polyphonus* (Mayr); Herzog Mountains; a large, richly coloured race with no throat wattle; male wing 120 mm.
f) *emilii* (Meyer); mountains of south-eastern New Guinea; differs from all the preceding by large throat wattle, in reduced amount of white in throat and duller ochraceous underparts; wing 111 mm.

REMARKS Unlike the mid-mountain melidectes with which this species shares the mid altitudes, the cinnamon-breasted wattled-bird is a common, noisy and conspicuous species in the second growth, scattered trees in the grasslands and gardens of the mid-mountain valleys.

### *Oreornis*

Two of the species in this genus are mountain or high mountain birds; the third lives near sea level.

#### Key to *Oreornis* Species

1 Ear spot yellow; size large, length 10¼ in.: *O. chrysogenys.*
  Spot back of ear white; size smaller, length 7–8 in.: 2.
2 Chin and upper throat black: *O. subfrenatus.*
  Chin and upper throat yellow-grey: *O. obscurus.*

#### *Oreornis chrysogenys* (van Oort)

Orange-cheeked Honeyeater. Length 9½–10¼ in. Adults: upperparts dark olive-green, feathers with dusky centres giving an obscurely streaked appearance; outer edges of wings and tail citrine-yellow; narrow areas in front and under eye greyish; side of head from bill to below

eye deep orange-yellow; ear-coverts yellow with a few dark feathers near eye; underparts dull olive grey-green and somewhat streaked; thighs yellowish; wing linings ochraceous to rust-yellow; iris brownish grey; bill black; gape and feet yellowish. Male wing 132 mm, tail 129 mm, culmen 27 mm, tarsus 41 mm. Female wing 126 mm.

RANGE Snow Mountains between 10,000 and 13,000 ft.

NESTING The nest is a basin-shaped structure resting on the bases of several fronds of a tree-fern in a scattered group of tree-ferns about 150 yards from any forest. The outer part of the nest is chiefly composed of coarse moss and lichens with a firmer inner cup of grass stems and fine fern material, and a thick felted lining of the scales and down from the leaves of tree-ferns and a few feathers. A single pale pink egg with spots of reddish brown and secondary greys plentiful about the larger end; size 33 × 21 mm.

REMARKS The orange-cheeked honeyeater is a fairly common bird of the timber line, living in the forest edge and in the scattered trees and shrubs that straggle upwards. A very few shrubs in the alpine grassland are enough to ensure the birds' presence. A bird often sits up straight on the top of a tree or shrub in a conspicuous place, and it sometimes hops about on the ground in marshy areas where the grass is very short. This species seems to feed largely on fruit with some insects and sedge seeds.

***Oreornis obscurus* (De Vis)**

Obscure Honeyeater. Length 7¼ in. Adults: upperparts olive-green with faint dusky centre streaks; crown olive-green with blackish streaks; outer edges of wings and tail yellowish olive; lores, throat, superciliary, incomplete subocular streaks and broad line behind eye lemon-yellow; auriculars white; underparts greyish tinged with olive on breast, more whitish on central abdomen; iris dark brown; bill black; gape yellowish white; feet pale slate-blue. Male wing 93 mm, tail 77 mm, culmen 26 mm, tarsus 22 mm. Female wing 82 mm.

RANGE Mountains of the Vogelkop, Central Ranges and mountains of south-eastern New Guinea, from 300 to 3,000 ft in forest.

NESTING A cup-shaped structure is suspended by its edges in a horizontal fork of a shrub, placed six feet above the ground; eggs two, pinkish white with scattered markings of pale reddish brown; size 22·5 × 16 mm.

REMARKS This species was found singly or in pairs around the epiphytes and creepers in trees and in the undergrowth where it diligently searched for insect food, but it also visited flowers in company with other honeyeaters.

### *Oreornis subfrenatus* (Salvadori)

Black-throated Honeyeater. Length 8 in. Adults: naked parts of eye-ring, face and gape yellow; upperparts dark olive-green with faint dusky centre streaks; sides of crown, lores, line under eye, sides of throat black; some flecks of white above and below eye; patch back of ear white; a line from bill, under eye to ears and a few feathers at sides of throat vivid orange-yellow; outer edges of flight feathers yellowish olive-green; underparts dark olive-green, more greyish, and with a few whitish feather tips on abdomen and chin and upper throat black; wing linings rusty yellow; iris dull brown; bill black; feet yellow. Male wing 102 mm, tail 96 mm, culmen 27 mm, tarsus 25 mm. Female wing 90 mm.

RANGE Mountains of New Guinea (Vogelkop, central ranges, Huon Peninsula, south-eastern New Guinea) between 4,500 and 11,000 ft.

SUBSPECIES Three, all very similar:

a) *subfrenatus* (Salvadori); Arfak Mountains.
b) *melanolaema* (Reichenow); mountains of western and central New Guinea (Weyland, Nassau, Oranje, Hindenburg, Victor Emanuel and Sepik Mountains).
c) *salvadorii* (Hartert); mountains of the Huon Peninsula and south-eastern New Guinea.

REMARKS This is a noisy bird in the treetops which often gives a series of little trills in continually changing key. It is quick and active in its movements, gleaning for insects through foliage and twigs, hopping along the bark of tree trunks, and along the top and sides of larger horizontal branches, peering over at the underside, continually using its wings to maintain its balance and fluttering out to snap up insects in flight. It is also a regular visitor at the many species of flowering trees where several may gather with the red and black myzomela. It quarrels with Belford's melidectes over the right to feed at these trees.

### *Xanthotis*

This genus contains two quite different looking species.

#### Key to *Xanthotis* Species

Length 6¼ in.; yellow ear patch; underparts white with triangular black spots: *X. polygramma*.
Length 7⅞ in.; narrow orange line in ear region; plumage generally brown (some races olive above and with yellow wash on breast): *X. chrysotis*.

### *Xanthotis chrysotis* (Lesson and Garnot)

Brown Xanthotis. Length 7⅞ in. Adults: (most subspecies) naked skin of

face light yellow or greenish grey (covered with white feathers in eastern islands subspecies); upperparts light brownish olive tinged with greenish yellow with crown darker and browner (upperparts yellowish green in western subspecies); wing-coverts and edges of wing-quills ochraceous brown; lores like crown; indistinct line below eye dusky; a trace of white at rear edge of naked eye space; a line near ear golden-yellow; throat and lower abdomen grey; rest of underparts pale brown faintly tinged tawny on breast (strongly washed with yellowish olive in western subspecies); under wing-coverts and edges of quills ochraceous to rusty yellow; iris brown; bill black; feet blue-grey. Male wing 101 mm, tail 82 mm, culmen 28 mm, tarsus 27 mm. Female wing 95 mm.

RANGE New Guinea lowlands up to 4,400 ft and most of the satellite islands and north-eastern Australia.

SUBSPECIES IN NEW GUINEA Thirteen in three groups with quite different characters:

Group 1. Western subspecies with naked area on side of head present, upperparts yellowish green and breast strongly washed yellowish green:

a) *fusciventris* (Salvadori); Waigeu and Batanta Islands.
b) *chrysotis* (Lesson and Garnot); Salawati Island, Vogelkop and Onin Peninsula; like *fusciventris* but back more brownish.
c) *austera* (Ripley); Misol Island; like *chrysotis* but darker.

Group 2. Central and eastern subspecies with naked area on side of head, back brown, and breast pale brown; nine similar subspecies:

d) *rubiensis* (Meyer); south coast of Geelvink Bay, including foothills of Gebroeders and Weyland Mountains.
e) *saturatior* (Rothschild and Hartert); Aru Islands and south New Guinea (Mimika River to Fly River).
f) subspecies?; south New Guinea (Wassi Kussa River area).
g) *giulianettii* (Mayr); south-east New Guinea (upper Fly River to Port Moresby).
h) *visi* (Hartert); south-east New Guinea (Cloudy Bay to Milne Bay).
i) *kumusii* (Mayr); north coast of south-east New Guinea (Collingwood Bay to Aicora River).
j) *madaraszi* (Rothschild and Hartert); Huon Peninsula, Markham and Watut River valleys.
k) *philemon* (Stresemann); north New Guinea (Astrolabe Bay west to Mamberamo River).
l) *meyeri* (Salvadori); Japen Island.

Group 3. Eastern islands race much like Group 2, but with skin behind and below eye covered with short white feathers; breast with a few obscure yellowish white spots.

m) *spilogaster* (Ogilvie-Grant); D'Entrecasteaux Islands (Fergusson, Goodenough and Normanby Islands) and Trobriand Islands.

NESTING [Cup-shaped, of rootlets and bark fibres and usually high in a forked branch. Eggs two, pinkish white with small red-brown and grey spots. Australian data.]

REMARKS This is a rather plain, medium-sized honeyeater, its general brownish coloration relieved only by the pattern on the side of the head. Locally it is one of the commonest species in the forest, where it ranges from the treetops, into the low substage and second growth, savannah and mangroves. Despite its large size, its movements are quick and active as it probes into flowers, and forages among the branches where it eats large insects such as beetles and caterpillars and also many small fruits. In a flowering tree this species may drive away other smaller honeyeaters, until it in turn is driven out by the Meyer's friar bird. However, when foraging the brown xanthotis may join a mixed flock of other smaller birds. At times it is rather noisy and gives a rather loud whistled song of some length.

***Xanthotis polygramma* (Gray)**

Spotted Xanthotis. Length 6¼ in. Adults: naked facial parts egg-yellow to rose behind eye; upperparts yellowish olive-green with prominent dark brown feather centres and small whitish tips on central back, nape and wing-coverts; top of head streaked with blackish brown; a small to large yellow ear spot; underparts greyish white, strongly streaked on chest and with brownish black bars and triangular marks on lower chest and abdomen; iris dark brown; bill black; feet lead-colour. Male wing 80 mm, tail 64 mm, culmen 23 mm, tarsus 20 mm. Female wing 70 mm.

RANGE Western New Guinea islands (Misol, Waigeu) and widespread in New Guinea forests from sea level to 4,200 ft.

SUBSPECIES Six very similar ones:

a) *polygramma* (Gray); Waigeu Island.
b) *kuehni* (Hartert); Misol Island.
c) *poikilosternos* (Meyer); Salawati, Vogelkop and Weyland Mountains to Victor Emanuel Mountains between 1,500 and 4,500 ft.
d) *candidior* (Mayr and Rand); south New Guinea (Oriomo River area) near sea level.
e) *lophotis* (Mayr); mountains of south-eastern New Guinea and of the Huon Peninsula.
f) *septentrionalis* (Mayr); north New Guinea region (Adelbert Mountains, Sepik region, Cyclops Mountains).

REMARKS The spotted honeyeater is a forest bird, usually found in the substage, but in south New Guinea it also ventured into the denser savannah. It occasionally came to feed in flowering trees with other species. On the north slopes of the Snow Mountains it often visited the white flowers of a climbing vine in the forest.

### *Lichmera*

In New Guinea this includes three species of small lowland honeyeaters of local distribution.

#### Key to *Lichmera* Species

1 Breast heavily streaked: *L. alboauricularis.*
Breast not streaked: 2.
2 Back olive-brown: *L. indistincta.*
Back olive-green: *L. argentauris.*

### *Lichmera indistincta* (Vigors and Horsfield)

Brown Honeyeater. Length 5¼ in. Adults: upperparts pale greyish olive-brown; outer edges of flight feathers olive-yellow; eye-ring largely naked and flecked with stubbly white feathers below and behind; an indistinct pale yellow post-auricular patch of feathers (usually); throat and chest pale brownish grey; lower chest and abdomen whitish tinged with yellow; iris dark; bill black; feet slate-colour. Male wing 69 mm, tail 55 mm, culmen 21 mm, tarsus 17 mm. Female wing 61 mm.

RANGE Australia, south central New Guinea, Aru Islands, and Lesser Sunda Islands. Found only near sea level in New Guinea.

SUBSPECIES IN NEW GUINEA Two:

a) *ocularis* (Gould); north and east Australia, south central New Guinea (Merauke district to middle Fly River).
b) *nupta* (Stresemann); Aru Islands; like *ocularis* but with eye-ring more nude and without a spot of yellow feathers behind eye.

NESTING [Nest a cup-shaped structure of palm fibres and bark shreds usually suspended in a small bush or low tree; eggs two, white with reddish brown spots; size 17 × 12 mm. Australian data.]

REMARKS Though very common locally in south New Guinea, this species has been found in only a few localities. One of these was in the low open savannahs of the middle Fly River area. There the birds were spread out, continually singing and often chasing each other in August and September. Though the birds were in breeding condition, no nests were found and at times a half dozen or so males gathered at some flowering tree along the edge of the forest. The sex ratio was very unbalanced, twenty-one males and only one female were taken.

***Lichmera alboauricularis* (Ramsay)**

White-eared Honeyeater. Length 6 in. Adults: upperparts olive-brown; outer edges of flight feathers tinged with yellowish olive; side of head with an indistinct white line (composed of stubby white feathers) from gape below eye to above ear-coverts; spot behind ear pale yellowish; ear-coverts grey; underparts whitish with bold brown feather centres on anterior half; abdomen more solidly whitish; iris dull brown; bill blackish brown; feet blue-grey; ocular space grey. Male wing 74 mm, tail 64 mm, culmen 22 mm, tarsus 19 mm. Female wing 62 mm.

RANGE Northern and south-eastern New Guinea.

SUBSPECIES Two:

a) *alboauricularis* (Ramsay); known only from two small offshore islands near Samarai in south-eastern New Guinea (Heath Island and Doini Island) and from Baroka (on Hall Sound) just west of Port Moresby.

b) *olivacea* (Mayr); northern New Guinea (Sentani Lake, lower Ramu River, Idenburg River, middle and lower Sepik River); like *alboauricularis* but darker olive above.

NESTING A semi-pensile cup-shaped nest was found attached to grass stems about six feet above the water of a grassy area in the lagoons of the Idenburg River, where this species was common. It probably belonged to the white-eared honeyeater.

REMARKS Along the Sepik River, this species was found alone or in small parties in the riverside coconut palms. It was common in the open stands of tall grass in the Idenburg River lagoons and was occasionally found in the second-growth trees along the waterways there. The birds apparently searched for their insect food among the giant grass stems and leaves. The song, often heard, was a coarse trill, and most of the birds collected were in breeding condition. In contrast to the sex ratio found in the brown honeyeater, the sex ratio here was about even, half males, half females.

***Lichmera argentauris* (Finsch)**

Plain Olive Honeyeater. Length 5⅝ in. Adult female: upperparts yellowish olive; lores flecked with a few stubby white feathers; naked area below and behind eyes (?) yellowish; ear-coverts greyish; underparts greyish, strongly tinted with yellow; iris grey-brown; bill black; feet grey-blue; wing 66 mm, tail 53 mm, culmen 18 mm, tarsus 18 mm.

RANGE The Moluccas and the islands of the western New Guinea region (Gebe Island, Waigeu Island, Misol Island, Schildpad Islands).

SUBSPECIES IN NEW GUINEA One, *argentauris* (Finsch).

REMARKS This seems to be a species found on small and medium-sized islands. In the Schildpads, Ripley found it by the blossoms of coconut palms and papayas.

### *Meliphaga*

Of the eleven New Guinea species in this genus, two, the singing and the yellowish honeyeater, are easily identified. The other nine species form a group of very closely related, very similar species, which have been a headache for many ornithologists. They have been included in a '*Meliphaga analoga* group' or a '*Meliphaga aruensis* group'. The species to be recognized have been classified only in recent years when adequate material became available. To identify the birds in life will require considerable study based on an adequate series of classified specimens. In the following notes, the species in the group are compared with the basic description of *M. aruensis* which is the best we can do. Many field observations will have to be recorded under '*M. aruensis* group' until the birds are better known. An understanding of this group is a challenge in field biology; the study of closely related species living in the same area.

#### Key to *Meliphaga* Species or Groups

Length $4\frac{7}{8}$ in.; side of head yellow with black line: *M. flavescens.*
Length $8\frac{1}{4}$ in.; underparts whitish with fine dark lines: *M. virescens.*
Length $5\frac{1}{4}$–$6\frac{5}{8}$ in.; upperparts generally plain olive; underparts grey, obscurely mottled at most; ear spot contrasting white or yellow: *M. analoga* and allies.

### *Meliphaga virescens* (Vieillot)

Singing Honeyeater. Length $8\frac{1}{4}$ in. Adults: upperparts greyish olive indistinctly streaked with brown; outer edges of wing quills olive-yellow; side of head with a bold black mask extending from lores to sides of neck; stripe from gape to ear-coverts yellow; longer ear-coverts and sides of neck whitish; underparts dull buffy white tinged with yellow and narrowly striped with brown; wing lining ochraceous; iris dark brown; bill black; gape chrome-yellow; feet light blue. Male wing 109 mm, tail 95 mm, culmen 24 mm, tarsus 24 mm. Female wing 99 mm.

RANGE Widespread in Australia, the islands of Torres Strait and in the lowlands of New Guinea and its satellite islands.

SUBSPECIES Three similar ones:

a) *versicolor* (Gould); north-east Australia (Cape York); islands of Torres Strait and coast of south New Guinea (Merauke to Port Moresby); underparts rather bright yellow with little grey.

b) *intermedia* (Mayr and Rand); islands of the south-eastern tip of New Guinea (Samarai Island, Doini Island, Killerton Islands); intermediate between *versicolor* and *sonoroides* in yellow coloration of underparts.

c) *sonoroides* (Gray); western New Guinea islands (Misol, Salawati, Batanta, Waigeu and Japen Islands), north coast of New Guinea (Vogelkop to Huon Gulf), D'Entrecasteaux Islands (Fergusson Island); like *versicolor* but underparts duller and greyer.

NESTING [Usually concealed in a bush or tree; cup-shaped; suspended by its edges; composed of grasses and lined with plant down or animal hair. Eggs two to three, pale whitish or pinkish, sometimes flecked with brown; size 22·1 × 15·8 mm. Australian data.]

REMARKS The singing honeyeater is a common, noisy bird in the coconut groves, mangroves and other coastal vegetation, and it comes into the trees and shrubbery of gardens even in villages. Perhaps *M. virescens* of Australia and *M. versicolor* of north Australia and New Guinea should be kept as two species.

***Meliphaga flavescens* (Gould)**

Yellowish Honeyeater. Length 4⅞ in. Adults: above light greyish brown; exposed edges of flight feathers yellowish olive; forehead, sides of head, ear-coverts and throat washed with yellow; a blackish 'moustache' line under eye to ear-coverts; underparts buffy greyish white; sides pale brownish grey; iris dark brown; bill black; feet dusky flesh-colour. Male wing 75 mm, tail 58 mm, culmen 17 mm, tarsus 18 mm. Female wing 69 mm.

RANGE North Australia and south-east New Guinea.

SUBSPECIES IN NEW GUINEA One, *germana* (Ramsay); known only from the Port Moresby district.

NESTING [Cup-shaped, of bark strips and rootlets; in small trees and bushes in savannah; eggs two, pinkish with small spots. Australian data.]

REMARKS Presumably this is a bird found in savannah trees.

***Meliphaga aruensis* (Sharpe)**

Puff-backed Meliphaga. Length 6⅜ in. Adults: upperparts olive-green; sides of head with a narrow yellowish rictal spot; auriculars pale yellow; lores and postocular areas tinged with blackish; underparts grey washed with yellow, darker on flanks; inner edges of remiges buffy whitish; iris dark brown; bill blackish brown; mouth and gape yellow; feet dull grey. Wing 89 mm, tail 72 mm, culmen 21 mm, tarsus 20 mm.

RANGE New Guinea and its satellite islands, from sea level to about 5,000 ft.

SUBSPECIES Two, differing only slightly:

a) *aruensis* (Sharpe); Aru Islands and southern New Guinea (Setekwa River to Milne Bay).

b) *sharpei* (Rothschild and Hartert); western Papuan Islands (Batanta, Waigeu), Vogelkop and northern New Guinea (east to Kumusi River), D'Entrecasteaux Archipelago and Trobriand Islands (Kiriwina).

NESTING The nest is a neat semi-pensile cup slung by its edges from a flat fork or from nearly parallel branches of a shrub or sapling in the forest undergrowth from one to three feet from the ground. Nest: outside of flakes of bark bound together with weathered plant fibre, or of pandanus fibres; a substantial lining of fine grass-like stems. One or two white eggs faintly tinged pink and with sparse brown spots; size 23 × 17·3 mm. The female incubates, with the male in attendance near the nest. The young has down on the upperparts only. Both male and female feed the young.

REMARKS This honeyeater is a fairly common, widespread species in the forest, where it is usually found in the undergrowth and substage. Its food includes both insects and fruit. In behaviour it seems identical with *M. analoga*. Its song was a slow trill.

***Meliphaga montana* (Salvadori)**

White-eared Mountain Meliphaga. Length 6⅝ in. Adults: (see *M. aruensis* for a general description); white auriculars, together with ochraceous tinted (not yellowish white) inner wing edges (exceptions: see young of *M. m. auga* and *M. m. setekwa*) distinguish this species from all other meliphagas; iris grey to brown; bill brownish black; gape pale yellow; feet blue-grey. Male wing 87 mm, tail 70 mm, culmen 22 mm, tarsus 23 mm. Female wing 76 mm.

RANGE Widespread in the mountains of New Guinea.

SUBSPECIES Nine:

a) *auga* (Rand); southern slopes of mountains of south-eastern New Guinea (3,600 to 4,350 ft) and lowlands of south New Guinea (Fly River); like *setekwa* but young have yellow, not white auriculars.

b) *setekwa* (Rand); Nassau and Oranje Mountains.

c) *montana* (Salvadori); Vogelkop (1,500 to 4,500 ft), Onin Peninsula (Kapur) and Weyland Mountains (900 ft).

d) *steini* (Stresemann and Paludan); Japen Island.

e) *sepik* (Rand); mountains of upper Sepik River (Hunsteinspitze and Victor Emanuel Mountains, 2,400 to 4,500 ft).

f) *germanorum* (Hartert); Cyclops Mountains.
g) *gretae* (Gyldenstolpe and Gilliard); mountains of the Wahgi region, (?) Adelbert Mountains.
h) *huonensis* (Rand); mountains of the Huon Peninsula.
i) *aicora* (Rand); north slopes of the mountains of south-east New Guinea.

NESTING The nest was a neat, semi-pensile cup slung from its edges in a horizontal fork of a small shrub in a shady forest glade about four feet above the ground. The nest was composed externally of fine weathered plant fibres and a large amount of animal silk; inside there was a thin lining of thread-like woody fibres and on the bottom of the cavity a thick pad of plant down from the silk cotton tree (the *M. aruensis* nest had no similar pad though the same material was available). A single buffy white egg with small brown spots forming a ring around larger end. Young with short greyish down on upperparts, none on underparts.

REMARKS In much of New Guinea, this fairly common, widespread species lives in the mid-mountain forests, from about 1,500 to 5,000 ft. In south New Guinea, however, along the Fly River, it ranges down to the lowlands as do a number of other mid-mountain birds. While generally a fairly common bird, it was very scarce in the lowland forests of south New Guinea.

There is nothing recorded in our notes to indicate that the present species differs in habits from *M. aruensis* and *M. analoga*.

### *Meliphaga mimikae* (Ogilvie-Grant)

Large Spot-breasted Meliphaga. Length 6¾ in. Adults (see *M. aruensis* for a general description) the combination of large size (male with wing over 81 mm), ochraceous wing linings (not whitish or tinged with yellow), and yellow auriculars, together with spotted underparts, distinguishes this species from others in the group; iris brown; bill blackish; feet slate-colour. Male wing 90 mm, tail 74 mm, culmen 22 mm, tarsus 23 mm. Female wing 82 mm.

RANGE Central and eastern New Guinea.

SUBSPECIES Two or possibly three rather well marked races:
a) *mimikae* (Ogilvie-Grant); southern slopes of the Nassau, Oranje and Hindenburg Mountains (sea level to 2,500 ft).
b) subspecies?; Bernhard Camp.
c) *granti* (Rand); mountains of south-eastern New Guinea (2,400 to 4,200 ft); like *mimikae* but larger and more heavily spotted on breast.

NESTING The female evidently builds, as one was seen carrying nesting material.

REMARKS Like *M. montana*, this forest species is usually a bird found in the mid-mountains, but in south New Guinea it comes down to lowland forests, at about 250 ft along the upper Fly River, and it is one of the less common species.

### *Meliphaga orientalis* (Meyer)

Small Spot-breasted Meliphaga. Length 6¼ in. Adults (see *M. aruensis* for a general description): small size; yellow auriculars; dark facial area; usually streaked or spotted appearance of underparts, together with whitish or buffy yellowish white wing linings, help to distinguish this species; iris light brown (near amber); bill black; feet pale blue. Male wing 78 mm, tail 68 mm, culmen 22 mm, tarsus 20 mm. Female wing 72 mm.

RANGE Waigeu Island and mountains of New Guinea.

SUBSPECIES Three:

a) *orientalis* (Meyer); mountains of south-eastern New Guinea (west in south to Angabunga River, in north to Mambare River; 2,300 to 3,750 ft).
b) *becki* (Rand); mountains of north-east New Guinea (Morobe district and Saruwaged Mountains, 3,840 to 4,800 ft).
c) *facialis* (Rand); mountains of central and western New Guinea (Oranje, Nassau, Weyland, Vogelkop Mountains; Waigeu Island).

REMARKS This small, slender-billed species seems to be a common mid-mountain forest bird throughout its range.

### *Meliphaga gracilis* (Gould)

Slender-billed Meliphaga. Length 5¼ in. Adults (see *M. aruensis* for a general description): characters which help to distinguish this species in the laboratory are: relatively long, slender bill, small size, solid olive forehead, yellow ear-coverts, uniform appearance of underparts, inner wing edges and linings yellowish white, not ochraceous; iris grey-brown; bill black; corners of mouth yellow; feet plumbeous grey. Male wing 73 mm, tail 54 mm, culmen 20 mm, tarsus 18 mm. Female wing 69 mm.

RANGE North-eastern Australia, Aru Islands and the southern and eastern lowlands of New Guinea.

SUBSPECIES IN NEW GUINEA Three:

a) *gracilis* (Gould); north-east Australia (Cape York), Aru Islands and lowlands of south New Guinea (Triton Bay to Oriomo River).
b) *cinereifrons* (Rand); south-eastern New Guinea (Hall Sound to Milne Bay).
c) *stevensi* (Rand); northern slopes of south-eastern New Guinea (Hydrographer Range, Kumusi River, upper Watut River).

NESTING A nest, seen but not collected, was in the top of a high forest tree; seen through binoculars, the nest seemed to be a deep semi-pensile cup slung by its edges in a horizontal fork near the end of a slender branch in the leafy crown of the tree. Both male and female came to the nest. [Nest cup-shaped, eight to fourteen feet up in a tree, made of shreds of bark and green moss and lined with plant down. Eggs two, pink with red-brown spots about larger end: size 19 × 13 mm. Australian data.]

REMARKS This was a common species in the middle and lower Fly River area where it frequented both forests and savannah. In general behaviour it was very similar to *M. analoga* but was more often found high in the treetops, which is in accord with its one recorded New Guinea nesting site. Its food included both fruits and insects, and it came to feed at flowering trees at the edge of the savannah.

***Meliphaga vicina* (Rothschild and Hartert)**

Louisiade Meliphaga. Length 6¾ in. Adults (see *M. aruensis* for a general description). This is the only species of this group known from the Louisiade Islands. Characters which help in the laboratory identification are large size (see wing), elongated bill, grey forehead and ochraceous under wing-coverts; iris dark brown; bill black; feet slate-blue. Male wing 90 mm, tail 72 mm, culmen 25 mm, tarsus 23 mm. Female wing 84 mm.

RANGE Known only from Tagula (Sudest) Island (up to at least 2,900 ft).

REMARKS This is a large species found on islands and it may be a representative of either *M. analoga* or *M. gracilis*, both of which it resembles equally well.

***Meliphaga analoga* (Reichenbach)**

Mimic Meliphaga. Length 6¼ in. Adults (see *M. aruensis* for a general description). Characters which help in the laboratory identification of this species are large size; underparts unspotted; forehead green; ear-coverts yellow; inner wing edges yellowish white; wing linings yellowish or ochraceous; iris grey or grey-brown or brown; feet ash-grey; bill blackish. Male wing 78 mm (to 88 mm), tail 67 mm, culmen 24 mm, tarsus 21 mm. Female slightly smaller.

RANGE Aru Islands, islands off western New Guinea (Misol, Waigeu, Batanta, Salawati and Japen Islands) and New Guinea (sea level to about 3,600 ft).

SUBSPECIES Six, differing only slightly:

a) *longirostris* (Ogilvie-Grant); Aru Islands.

b) *analoga* (Reichenbach); islands of western New Guinea (Misol, Salawati, Batanta, and Waigeu Islands), all of New Guinea excepting ranges of (c), *flavida*, (e), and *citreola*.
c) subspecies?; Oriomo River.
d) *flavida* (Stresemann and Paludan); Japen Island and north coast of New Guinea (Geelvink to Astrolabe Bays).
e) subspecies?; Huon Peninsula and Sepik area.
f) *citreola* (Rand); slopes of Idenburg River (2,550 to 3,600 ft); a higher altitude representative of *flavida*.

NESTING Nest a deep cup slung in a fork of a small bush, about three feet above the ground; eggs two, cream-coloured tinged pink with a wreath of brown spots about larger end; size 22·3 × 14·7 mm. (Stein.)

REMARKS This widespread species of the lowlands and foothills seems to be the most common generally of the group of puzzling honeyeaters to which it belongs. In south New Guinea it was very common, and usually solitary in the lower parts of the forest where it seemed to glean for insects among the twigs and leaves. Stomach examinations, however, showed that fruit was also an important part of its diet. This species rarely visits flowering trees, but on occasion it does so in company with other honeyeaters, including *M. gracilis* and *M. flavirictus*. It may also go into the treetops. As with some other forest birds, this species bathes by perching above a forest pool, flying down and splashing in the water and then flying back to a perch to preen.

### *Meliphaga albonotata* (Salvadori)

White-marked Meliphaga. Length 6 in. Adults (see *M. aruensis* for a general description). White ear tufts distinguish this species from all of the meliphagas except *M. montana*; yellowish white (not ochraceous) inner edges of wings distinguish *M. albonotata* from *M. montana*; bill brownish black; feet grey-brown. Male wing 82 mm, tail 67 mm, culmen 22 mm, tarsus 20 mm. Female wing 78 mm.

RANGE Recorded from many scattered localities in the lowland forests of New Guinea.

REMARKS The main difference between this monotypic species and *M. analoga* is the white ear spot, and it was for a long time considered a mutant of the yellow-eared *M. analoga*. The two seem to live together in lowland forests, but *M. albonotata* seems to be rather scarce and we have no notes on its habits.

### *Meliphaga flavirictus* (Salvadori)

Yellow-gaped Meliphaga. Length 6 in. Adults (see *M. aruensis* for a general description). Characters which help in the identification of

this species are bright yellow, relatively broad rictal spot extending from gape to beneath eye; forehead slightly brighter green than back; maxilla usually horn-colour, not black; chin often washed with yellow; auriculars, linings and inner edges of wings pale yellowish white; iris light grey-brown; bill blackish, mandible horn-brown, streaked with blackish; gape yellow; feet yellowish olive. Male wing 77 mm, tail 67 mm, culmen 22 mm, tarsus 19 mm. Female wing 74 mm.

RANGE Widespread in New Guinea; lowlands to 3,750 ft.

SUBSPECIES Two:

a) *flavirictus* (Salvadori); south New Guinea (Oriomo River east to southern slopes of south-east New Guinea).

b) *crockettorum* (Mayr and de Schauensee); western and northern New Guinea (Vogelkop, subspecies?), Nassau Mountains (Utakwa River), Snow Mountains (Bernhard Camp) and (subspecies?), middle Sepik River (Kanganaman), upper Watut River (Herzog Mountains).

REMARKS This is one of the scarcest species of this group. The few notes on its habits suggest these are somewhat different from those of *M. analoga*, more like those of *M. gracilis*. On the lower Fly River, where only five specimens were taken on an Archbold expedition which found *M. analoga* very common, the following notes were made on three individuals. One was found in the top of a big, flowering *Eugenia* tree in the forest where a number of other species were gathered to feed; another was in the top of a forest tree; and the third was in the top of a savannah tree near the forest. Two of these birds had eaten only insects.

### *Ptiloprora*

There are five closely related mid- and high-mountain species in this genus.

#### Key to *Ptiloprora* Species

1 Breast streaked yellowish olive and grey: *P. meekiana*.
Breast streaked black and grey-white: 2.
Breast grey: 3.

2 Back feathers black, edged grey: *P. perstriata*.
Back feathers black, edged rufous: *P. guisei*.

3 Flanks grey: *P. plumbea*.
Flanks with rufous: *P. erythropleura*.

### *Ptiloprora plumbea* (Salvadori)

Leaden Honeyeater. Length $5\frac{7}{8}$ in. Adults: upperparts dark lead-grey boldly striped with blackish brown; wings and tail blackish brown with thin grey edges; underparts lead-grey with whitish tipping on

throat and upper chest; abdomen washed with olive-brown; linings and inner edges of wings grey tinged with ochraceous; iris silver-grey or light brown; bill black; feet slate-blue. Male wing 77 mm, tail 66 mm, culmen 20 mm, tarsus 23 mm. Female wing 69 mm.

RANGE Mountains of western, central and south-eastern New Guinea; (3,600 to 6,000 ft).

SUBSPECIES Two very similar ones:

a) *plumbea* (Salvadori); mountains of south-eastern New Guinea and Herzog Mountains.
b) *granti* (Mayr); mountains of western and central New Guinea (Nassau and Hindenburg Mountains); like *plumbea* but darker and with a longer wing.

REMARKS This is apparently a very local and rare species found in the mid-mountain forests.

***Ptiloprora meekiana* (Rothschild and Hartert)**

Meek's Streaked Honeyeater. Length 6½ in. Adults: upperparts yellowish olive boldly striped with blackish olive; wings and tail blackish brown, feathers with yellowish olive edges; underparts pale yellowish olive, strongly streaked with dusky olive; throat lighter, more pale yellow; abdomen, wing linings and tufts at sides of chest yellowish; iris greyish white; bill black, mandible dark grey with the tomium and gape olive; feet blue-grey. Male wing 90 mm, tail 80 mm, culmen 18 mm, tarsus 25 mm. Female wing 76 mm.

RANGE New Guinea mountains; south-east New Guinea, the Huon Peninsula, and the Oranje Mountains (4,500 to 8,400 ft).

SUBSPECIES Two, differing only slightly:

a) *meekiana* (Rothschild and Hartert); south-eastern New Guinea (including Herzog Mountains) and the Huon Peninsula (Saruwaged Mountains); 4,500 to 6,000 ft.
b) *occidentalis* (Rand); north slopes of the Snow Mountains; 6,600 to 8,400 ft.

REMARKS On the north slope of the Snow Mountains this honeyeater was fairly common and was usually found gleaning through the tops of substage trees in the forest. It was frequently part of a mixed flock of birds. Stomach analysis indicated a diet of medium-sized insects.

***Ptiloprora erythropleura* (Salvadori)**

Red-sided Streaked Honeyeater. Length 6½ in. Adults: upperparts generally blackish with indistinct dark olive-grey or grey edges, giving a streaked appearance; lower back and rump washed with olive-brown;

underparts grey with narrow whitish edges on chest and central abdomen, and sides strongly chestnut-brown; iris reddish; bill black; feet blue-grey. Male wing 89 mm, tail 76 mm, culmen 23 mm, tarsus 24 mm. Female wing 78 mm.

RANGE Mountains of western New Guinea; 4,500 to 8,400 ft.

SUBSPECIES Two, differing only slightly:
a) *erythropleura* (Salvadori); mountains of the Vogelkop (Arfak and Amberbaken Mountains, 4,500 to 6,600 ft).
b) *dammermani* (Stresemann and Paludan); mountains of mid-western New Guinea (Weyland and Snow Mountains, 6,600 to 8,400 ft); like *erythropleura* but darker grey below with darker brown sides.

REMARKS This is a little known species of the mid-mountain forests. Its diet, judging by stomach contents, is insects and berries.

***Ptiloprora guisei* (De Vis)**

Red-backed Honeyeater. Length 6 in. Adults: upperparts heavily striped with black; the feather edges of the shoulders and back bright chestnut, the head pale olive-grey, and of the rump olive-brown; sides of head and throat dark grey; sides of neck and body chestnut-brown; breast and abdomen boldly streaked with black; under tail-coverts and outer edges of wing quills buffy brown; upper wing-coverts and tail with some whitish tipping; iris pea-green; bill black; feet blue-grey. Male wing 89 mm, tail 74 mm, culmen 27 mm, tarsus 27 mm. Female wing 81 mm. Young strongly washed with olive-green.

RANGE Central and eastern New Guinea mountains, from 3,900 to 8,520 ft.

SUBSPECIES Three rather similar ones:
a) *mayri* (Hartert); Cyclops Mountains.
b) *umbrosa* (Mayr); Central Highlands.
c) *guisei* (De Vis); mountains of south-east New Guinea, Herzog Mountains, and those of Huon Peninsula.

NESTING The nest is a cup-shaped, rather untidy structure slung between the arms of a drooping fork of a vine and woven to the vines and the leaves on each side; nest of rootlets and dried leaves of climbing bamboo, lined with fine hair-like fibres from a tree-fern, and decorated outside with green moss. Two eggs, judging by the young in the nest.

REMARKS In south-east New Guinea this is a common bird in the mountain forests, from 4,500 to 8,500 ft, above which another species, *P. perstriata*, replaces it. The red-backed honeyeater is an active bird, ranging from treetops to the undergrowth, gleaning among twigs and

leaves, probing among flowers, or even darting down to the ground for its insect food. It also visits fruiting trees. The tail is frequently cocked up as it hops about. It is a noisy bird with a rusty 'chirp', a 'chip-chip-chip', and a whistled 'whee-u'.

***Ptiloprora perstriata* (De Vis)**

Black-backed Streaked Honeyeater. Length 7¾ in. Adults: upperparts heavily striped with black; the feathers narrowly edged grey on the head and upper back and dark olive-brown on the lower back and rump; upper wing-coverts and outer edges of wing quills edged with brown; underparts boldly striped and spotted with black; throat more uniform greyish; sides and abdomen strongly washed with dark chestnut-brown; iris pale green; bill black, gape yellow; feet bluish grey. Male wing 98 mm, tail 91 mm, culmen 29 mm, tarsus 30 mm. Female wing 92 mm. Young washed with olive-green.

RANGE Central mountains of New Guinea, exclusive of the Vogelkop.

SUBSPECIES Four nearly similar ones:

a) *perstriata* (De Vis); mountains of south-eastern New Guinea (9,000 to 11,000 ft).
b) *lorentzi* (van Oort): mountains of the main body of New Guinea (Weyland Mountains to Central Highlands, 5,700 to 12,000 ft).
c) *incerta* (Junge); Nassau Mountains at Wissel Lakes; based on a single specimen.
d) *praedicta* (Hartert); Wandammen Mountains (Mt Wondiwoi, 4,500 to 6,000 ft).

REMARKS In the Snow Mountains this was a common species from about 5,500 to 12,000 ft, while in south-eastern New Guinea it lives only above 9,000 ft, the lower altitudes being occupied there by the closely related *P. guisei* which is absent from the Snow Mountains.

This species is most catholic in its choice of habitat which includes open, dense and mossy forest, from near the ground to the treetops. Sometimes one sits quietly in a treetop giving its plaintively whistled 'whee-u', or 'a-whee', or 'chee-a-wee', perhaps the commonest bird-calls at high altitudes. This species usually goes about singly or in pairs, actively probing about the epiphytes, orchids and mosses on the tree trunks. It may explore the surface roots of the trees, and tussocks of grass or moss, glean through twigs and leaves of the treetops, sometimes hanging upside down, probe into flowers and fly out and snap up passing insects, flycatcher fashion. In addition to insects, it also eats fruits.

From the point of view of adaptation to high altitudes, this species is especially interesting for, like a number of other species, it shows increase in size with increase in altitude.

### *Pycnopygius* and *Philemon*

Though all the species in these two genera are quite distinct, there seem no obvious characters for separating them into two groups. Hence, they are keyed out together.

### Key to *Pycnopygius* and *Philemon* Species

1 Crown black, streaked white: *Pycnopygius stictocephalus.*
. Breast grey, feathers tipped white: *Py. cinereus.*
. Some naked skin on head: 2.
. No naked skin on head: 5.
2 Length 11–13 in.: 3.
. Length 8½–9½ in.: 4.
3 Side of head and forecrown naked: *Philemon novaeguineae.*
. Side of head and whole crown naked: *Ph. corniculatus.*
4 Cheeks to bill bare, breast flecked with white: *Ph. citreogularis.*
. Cheeks partly bare, with some stubby feathers, no white flecks on breast: *Ph. brassi.*
5 Length 8½ in., bill longer: *Ph. meyeri.*
. Length 7 in., bill shorter: *Py. ixoides.*

### *Pycnopygius stictocephalus* (Salvadori)

Streak-capped Honeyeater. Length 8¼ in. Adults: upperparts dark brown (worn feathers fade to pale brown); crown blackish, each feather vividly tipped with white, giving a streaked appearance; sides of head dark brown; malar streak whitish; chin and sides of throat with blackish brown areas; underparts greyish brown lightly tinged with ochraceous on abdomen; wing linings ochraceous; iris brown (or red?); bill blackish brown with some pinkish at base of mandible; feet greyish blue. Male wing 108 mm, tail 94 mm, culmen 25 mm, tarsus 23 mm. Subadults of both sexes have the crown solid brown.

RANGE Aru Islands, Salawati Island and all New Guinea; sea level to 900 ft).

REMARKS A rare but widely distributed monotypic species in the lowland forests. All three species of *Pycnopygius* seem to have similar habits, judging by the few scattered notes we have. They glean for insects among the twigs and leaves of the middle and upper parts of the forest; they visit flowering trees; and also eat fruits.

### *Pycnopygius cinereus* (Sclater)

Grey Honeyeater. Length 8¾ in. Adults: upperparts dark greyish olive, the feathers with broad dark brown central stripes; crown more blackish with greyish edges to feathers; rictal line narrow and whitish; throat and ear tufts whitish; underparts greyish tinged with yellowish olive,

darker on breast and lighter on abdomen, the feathers with broad (or faint and narrow) grey-white tips except on abdomen; under tail-coverts tinged with buff; wing linings ochraceous; iris light grey; naked ocular skin blue-grey; bill black; feet light blue-grey. Male wing 104 mm, tail 97 mm, culmen 28 mm, tarsus 28 mm. Female wing 100 mm.

RANGE Mountains of New Guinea, 3,200 to 6,400 ft (occasionally down to 1,600 ft).

SUBSPECIES Three:

a) *cinereus* (Sclater); mountains of the Vogelkop; rather pale and faintly spotted below.
b) *dorsalis* (Stresemann and Paludan); Weyland Mountains; like *cinereus* but darker.
c) *marmoratus* (Sharpe); mountains of south-eastern New Guinea (including Herzog Mountains); mountains of Huon Peninsula (Saruwaged Mountains), Central Highlands and Snow Mountains; like *cinereus* but more heavily spotted below.

REMARKS This is an uncommon bird of the mid-mountain forests and forest edges.

***Pycnopygius ixoides* (Salvadori)**

Brown Honeyeater. Length 7 in. Adult male: above dark greyish olive-brown feathers with indistinct dark centre striping, particularly on head; below olive greyish-brown; linings of wings ochraceous; iris rust-brown; bill black; feet grey; wing 88 mm, tail 75 mm, bill 20 mm, tarsus 22 mm. Female wing 83 mm.

RANGE Widespread but of local occurrence in New Guinea; lowland forests up to 5,400 ft.

SUBSPECIES Four, varying in general colour tone:

a) *ixoides* (Salvadori); west New Guinea, east in the north to the head of Geelvink Bay, in the south to the upper Fly River.
b) *proximus* (Madarász); north New Guinea (Mamberamo River to Astrolabe Bay); like *ixoides* but darker brownish.
c) *unicus* (Mayr); Huon Peninsula and Herzog Mountain slopes; like *ixoides* but with olive, not grey edges of the feathers of crown and foreback; wing feathers edged with rust-colour.
d) *finschi* (Rothschild and Hartert); south-east New Guinea (Kumusi River to Milne Bay); no definite records from the south coast; like *unicus* but much more reddish in colour.

REMARKS This species is local in occurrence, so it is rather rare in collections, but it has been found to be fairly common in a few places.

***Philemon meyeri* (Salvadori)**

Meyer's Friar Bird. Length 8½ in. Adults: upperparts dark greyish brown with indistinct blackish brown centre streaks in feathers; underparts drab grey; iris dark brown; bill black; feet slate; naked skin of face bluish black. Male wing 107 mm, tail 97 mm, culmen 32 mm, tarsus 25 mm. Subadults may have chest washed with sulphur-yellow.

RANGE Eastern New Guinea, west in the south to the Fly River, in the north to the head of Geelvink Bay; lowlands to 3,500 ft.

REMARKS Meyer's friar bird was a common solitary, somewhat retiring bird in the second storey and also the taller treetops of the forest; it also often came to flowering trees to feed. It was considerably less active than some of the smaller honeyeaters, and often sat up quietly on some exposed perch for minutes at a time. Though it occasionally gave a single loud cry, a 'tcheu', it is more retiring than and not nearly as noisy as the New Guinea friar bird. Like many honeyeaters, it is very possessive about the flower tree in which it is feeding, and is continually trying to chase out others of the same or different species. Its forehead is often caked with pollen from the blooms. Its food appears to consist of insects only.

***Philemon brassi* (Rand)**

Brass's Friar Bird. Length 8½ in. Adults: upperparts dark greyish olive-brown; forehead narrowly and sides of head around eye largely naked, greyish black and flecked in the area of eye with short, white feathers; chin and upper throat whitish; line from mandible to ears and lower throat dark grey with much narrow whitish tipping to feathers; remaining underparts and wing linings dull whitish, becoming dull brownish white on chest; iris dark brown; bill black; feet dark grey. Male wing 103 mm, tail 84 mm, culmen 28 mm, tarsus 25 mm. Female slightly smaller.

RANGE Known only from the lowlands (150 ft) of the Idenburg River, a tributary of the Mamberamo River.

REMARKS This species is known only from a small area of flooded tall open cane grass and dense second-growth trees around the end of one of the lagoons of the Idenburg River. There it was a common, noisy bird easily seen as it perched in the canes or trees or flew from one to another, and sometimes congregated in parties of a dozen or so. The food, judging by stomach contents, includes both insects and fruits.

***Philemon citreogularis* (Gould)**

Yellow-throated Friar Bird. Length 9½ in. Adults: upperparts dark greyish brown with narrow whitish tipping on rump feathers and upper tail-

coverts; forehead (narrowly) and sides of head around eye naked (blackish?) and flecked over the eye with stubby brown feathers; chin and upper throat whitish (strongly washed with sulphur-yellow in subadults); ear-coverts and underparts except chest dull whitish grey; lower throat and breast brownish grey with the feathers of the breast finely tipped with white; bill black; feet greyish. Male wing 124 mm, tail 97 mm, culmen 32 mm, tarsus 28 mm. Female wing 118 mm.

RANGE Australia and south New Guinea.

SUBSPECIES IN NEW GUINEA One, *papuensis* (Mayr and Rand); known only from the Oriomo River and the Merauke district, extreme south central New Guinea.

NESTING [Nest deep, cup-shaped, and rather loosely made of dry grass, and strips of bark and animal silk, lined with fine grass; suspended by its edges from a fork of a tree, often near the end of a branch; eggs two or three, pinkish buff spotted and blotched with chestnut and purple-brown especially on larger end; size 27 × 18·5 mm. Australian data.]

REMARKS This was fairly common, but the least common of the three friar birds of the savannahs in south New Guinea, and its habits and habitat preferences seem to be the same as those of the bald friar bird.

***Philemon corniculatus* (Latham)**

Bald Friar Bird. Length 11¾ in. Adults: upperparts dark greyish brown, feathers with narrow blackish shaft lines; rump feathers and upper tail-coverts narrowly tipped with white; entire head and sides of neck naked and black, but with a few stubby blackish brown or hair-like feathers about eye, on central nape, forehead and sides of throat; chin, upper throat and upper chest silvery white, the feathers with narrow blackish shafts; central throat largely naked with a stripe of blackish brown feathers on midline; sides of chest and body nearly solid greyish brown; remaining underparts largely whitish; iris grey; bill black; feet greyish black. Male wing 138 mm, tail 115 mm, culmen 27 mm, tarsus 33 mm. Female wing 132 mm.

RANGE Australia and southern New Guinea.

SUBSPECIES IN NEW GUINEA One, *ellioti* (Mathews); north Queensland and extreme south central New Guinea (Oriomo River to Wassi Kussa River).

NESTING [Nest a deep, firm, cup-shaped structure of grass and strips of bark and animal silk, and lined with dry grass; suspended by its rim from a flat fork near the end of a branch of a tree, fifteen to fifty feet up; eggs two to four, pinkish buff spotted with cloudy markings of chestnut

and grey; size 30·5 × 22·5 mm. Australian data.] A single fledgling, not long out of the nest, had short scant brownish grey down on the tips of the feathers of its upperparts.

REMARKS The bald friar bird was perhaps the commonest and certainly the noisiest bird in the low open savannah near the coast, but it is evidently very local in occurrence. In addition to hopping about among the branches of the savannah trees, this species probed into the red blossoms of tea trees, and, with the yellow-throated friar bird, numbers gather to feed on swarming termites, dashing out to pluck them from the air. On two occasions both these friar birds pursued and scolded small hawks through the savannah.

***Philemon novaeguineae* (Müller)**

Leatherhead; New Guinea Friar Bird. Length 13 in. Adults: upperparts dark greyish brown feathers, with narrow blackish shaft lines; sides of face and malar region (and sometimes forecrown) naked and sooty black, but with inconspicuous black hair-line feather shafts; hind crown, nape, ear-coverts light brown (appearing crinkled or frilled on nape and ear-coverts) edged with buff; throat and upper breast dark grey-brown feathers with blackish shafts and broadly edged with whitish; rest of underparts generally pale brownish grey feathers with indistinct dark shafts; bill with or without bare knob at base; iris brown; bill and feet dark brown. Male wing 160 mm, tail 129 mm, culmen mm, tarsus 41 mm. Female wing 146 mm.

RANGE Northern Australia, Aru Islands, New Guinea lowlands and nearly all of its satellite islands (including such outliers as Kofiau Island, Misol Island, Trobriand Islands and Tagula Island), Umboi Island and New Britain Island.

SUBSPECIES IN NEW GUINEA Eight, perhaps more:

a) *aruensis* (Meyer); Aru Islands; above pale brown with a small bill knob.
b) *novaeguineae* (Müller); western Papuan Islands (Kofiau, Misol, Salawati, Batanta, and Waigeu Islands) and north-west New Guinea, east in south to Etna Bay, east in north to the head of Geelvink Bay; like *aruensis* but head darker and knob at base of bill smaller.
c) *brevipennis* (Rothschild and Hartert); south New Guinea between Mimika and Eilanden Rivers; like *novaeguineae* but wing shorter (139–50 mm) and bill more slender.
d) subspecies?; south-east coast of New Guinea.
e) subspecies?; north-east coast of New Guinea.
f) *subtuberosus* (Hartert); D'Entrecasteaux Archipelago (Fergusson,

Goodenough and Normanby Islands) and Trobriand Islands; like *brevipennis* but with darker and browner underparts and knob on bill very little developed.

g) *tagulanus* (Rothschild and Hartert); Tagula Island, Louisiade Archipelago; differs from the above in the small bill.

h) *jobiensis* (Meyer); Japen Island and northern New Guinea (Mamberamo River east to Malalo on south coast of Huon Gulf near Salamaua); differs from the above in having practically no knob on bill and face fully covered with bristles.

NESTING The nest is a deep, rather untidy but firm cup, slung from its edges in a lateral fork of a tree, twenty-five to forty-five feet up; composed of slender soft stems and weathered bark fibres, and lined with fine semi-woody stems; eggs two or three, pale pink with brown spots of varying shades; size 32·5 × 23 mm. The young are quite without down; unlike those of the bald friar bird.

REMARKS The New Guinea friar bird or 'leatherhead', as it is called locally, is the first land bird one encounters in New Guinea. In fact, it can often be heard from aboard coastal ships. It is the most noisy bird in the lowlands and its calls are a series of ludicrous bugles. It seems to occur everywhere in the lowland forests, forest edge, second growth, savannahs, trees along the beach and occasional trees growing in towns and gardens.

This species often sings from high concealed perches. Its bugles dominate the forest and forest edge and are rivalled in volume only by the bugles of the greater bird of paradise (*Paradisaea apoda*) and the black and white bell magpie (*Cracticus cassicus*). Its calls are extremely odd and variable; some have been recorded as 'yes-joe-joe—, kip-kip-kip-kup'. Another, heard at Lae, was 'stik ta-ba-co', repeated rapidly and shrilly. Another was 'ka-kek-ka-ke-kek-ku'. Another was 'to-go-lee', and on one occasion the junior author watched one bird call 'ki-kor-rik' and heard another directly over his head add 'queww'; each time the first three notes were delivered, so that from almost any other position these antiphonal calls would have sounded as if they were emitted by a single bird.

The New Guinea friar bird feeds on fruits and insects, chiefly from among leaves and flowers in high trees, but it also occasionally hawks for insects in flight.

On 30 October, the junior author was surprised to see a number of pairs of leatherheads sitting on dead branches above the forest five miles from Lae. Some flew about chasing and then sat preening in the dull light of dusk.

## Family Dicaeidae *Flowerpeckers*

*(Fifty-four species, twelve species in New Guinea)*

Members of this family live in southern Asia and the islands south and east to Australia and the Solomon Islands. Some gather into flocks, others are more solitary. These birds are found in trees and shrubbery and feed largely on fruit, but also eat some insects and spiders. Some species feed at flowers, perhaps on nectar, certainly on insects there. Nests are of several types: a pendant structure of felted plant down and animal silk with a side opening; an open cup placed in a fork; and a lined nest in a hole. The eggs are one to three in number, plain white or spotted; at least some young have natal down; in immature plumage, the young resemble in general the adults, but duller, or the female when there is dimorphism. The birds pair and both sexes share some nest duties at least.

There are twelve species in New Guinea where the greatest variety of flowerpeckers are found. Of most of these the nesting is unknown.

### Synopsis of Genera of New Guinea *Dicaeidae*

DICAEUM Four species; very small, length 3½ in.; tail short; upperparts olive to glossy black; underparts grey to yellowish olive; birds with or without red on crown, upper tail-coverts and throat; sexes different.

MELANOCHARIS Five species; small, 4½–6 in.; tail moderate to long, nearly square to much rounded; cutting edges of bill serrate; colour pattern simple: black above, grey below; or olive above, olive greyish below, obscurely streaked in one species; sexes alike or different.

RHAMPHOCHARIS One species; small, 4½ in.; the only member of the family with a comparatively long, slender bill; coloration of male green above, grey below; female green and grey, obscurely spotted and with yellow-white triangular spots on tips of back feathers.

OREOCHARIS One species; small, 5 in.; tail moderate; coloration distinctive; male black, green, and bright yellow in bold pattern; female grey and green with wavy barring over yellow flanks and lower breast.

PARAMYTHIA One species; medium, 8 in.; black crest and long, rounded tail; sexes alike, bold pattern of blue, black, white and yellow.

### Key to *Dicaeum* Species

1 Red patch on breast at least: adult males, 2.
  No red on breast: females.
2 Crown and upper tail-coverts olive like back: *D. pectorale.*
  Crown and upper tail-coverts black like back: *D. hirundinaceum.*
  Crown and upper tail-coverts red: 3.

3 Back olive or glossed purple: *D. geelvinkianum.*
Back dark olive glossed oil-green; Louisiade Archipelago only: *D. nitidum.*

***Dicaeum pectorale* (Müller)**

Olive-crowned Flowerpecker. Length 3½ in. Adult male: upperparts olive; throat white; breast greenish olive with a large red spot in centre; middle of abdomen and under tail-coverts yellowish white; flanks olive; remiges and rectrices dusky black glossed with blue, the remiges also edged with green; iris brown; bill black with base of mandible pale; feet dark brown; wing 53 mm, tail 26 mm, culmen 11 mm, tarsus 12 mm. Female: like male but without red; wing 50 mm.

RANGE Western Papuan Islands (Misol, Kofiau, Salawati, Batanta, Waigeu) and Vogelkop.

NESTING The nestling has natal down, brownish above, greyish below.

REMARKS This species is a geographical representative of the two following species (*D. geelvinkianum* and *D. nitidum*) and probably has similar habits.

***Dicaeum geelvinkianum* (Meyer)**

Red-capped Flowerpecker. Length 3½ in. Adult male: crown, rump and upper tail-coverts dull to bright red; breast spot bright red; depending on the subspecies the back is olive glossed blue or black glossed blue or purple; sides of breast and abdomen greyish olive or yellowish olive, paler or more yellowish along midline; lateral pectoral tufts white; under tail-coverts sometimes tinged red; remiges dusky black edged olive; rectrices black glossed blue; iris brown; bill black but pale at base of mandible; feet dark brown; wing 50–58 mm, tail 25 mm, culmen 12 mm, tarsus 12 mm. Female: like male but duller and without red on breast. Immatures: like female but without red on upperparts.

RANGE New Guinea (except Vogelkop) in lowlands and foothills up to 6,400 ft, also islands in Geelvink Bay and D'Entrecasteaux Archipelago.

SUBSPECIES Eleven, some rather different but intermediate subspecies are also known:

a) *maforense* (Salvadori); Numfor Island, Geelvink Bay; upperparts olive, glossed blue on back; crown, rump and upper tail-coverts dull red; bright red breast patch small; male wing 52 mm.
b) *mysoriense* (Salvadori); Biak Island, Geelvink Bay; like *maforense* but red patch on throat smaller; flanks greyer.
c) *geelvinkianum* (Meyer); Japen and Kurudu Islands, Geelvink Bay; like *mysoriense* but crown and upper tail-coverts both bright red; red breast patch moderate in size; upperparts more greenish.

d) *obscurifrons* (Junge); Wissel Lakes area of extreme western end of Snow Mountains; most like *maforense* but larger and red breast patch brighter red; male wing 58 mm.

e) *setekwa* (Rand); southern slopes of Snow Mountains; like *geelvinkianum* but upperparts blackish olive; male wing 52 mm.

f) *centrale* (Rand); Balim Valley, north slope of Snow Mountains; like *setekwa* but back blacker and size larger; male wing 58 mm.

g) *diversum* (Rothschild and Hartert); north New Guinea (Mamberamo River to Humboldt Bay); like *centrale* but smaller; male wing 52 mm.

h) *rubrocoronatum* (Sharpe); south-eastern New Guinea, west in the north to Sepik area, in south to Purari River; like *diversum* but red of crown and upper tail-coverts darker; back still blacker and more purple glossed; male wing 53 mm.

i) *violaceum* (Mayr); D'Entrecasteaux Islands; like *rubrocoronatum* but upperparts duller, less glossy; gloss more purplish violet; red areas on average darker; underparts greyer; wing 53 mm.

j) *rubrigulare* (D'Albertis and Salvadori); south New Guinea on Fly River; like *rubrocoronatum* but red breast spot larger extending onto throat; chin still white.

k) *albopunctatum* (D'Albertis and Salvadori); south New Guinea from Oriomo River to Digul River, also Daru Island; like *rubrigulare* but red throat patch still larger and covers chin; abdomen paler.

NESTING The nest is a pensile, pear-shaped structure with a side entrance near the top; of grey animal silk and reddish brown strips from ferns, felted together. It is hung from the stem of a short, slender croton tree in a native garden; eggs two, chalky white.

REMARKS The red-capped flowerpecker, a tiny, short-tailed, short-billed, dumpy bird living in the trees, is apparently generally distributed and fairly common throughout most of its range, but it is surprising in retrospect to note how few meaningful field observations have been made. Items like 'perched in a treetop' seem hardly worth collecting. However, it is worth noting that in south New Guinea this species occurred in dense savannah as well as in forest, and in the Grand Valley of the Balim River it was found in the residual patches of trees in the extensive farming country, and in both localities more birds were seen than where forest predominated. Perhaps this reflects the difficulty of finding small birds in tall forest trees.

In southern Asia, related flowerpeckers are said to be active, fat little birds darting from one flowering shrub to another and often congregating in the tops of tall flowering trees to feed at the blossoms. They also eat berries and search the foliage for insects and spiders. In the Philippines, they have been seen to alternate periods of activity

with long periods of sitting quietly on a twig, and while usually solitary, considerable numbers gather to feed on the fruit of certain forest trees. In New Guinea, however, where we spent a considerable time watching both fruit and flower trees where many species of honeyeaters, lories and berrypeckers came to feed, we made no record of this flowerpecker doing so.

Judging by examination of stomach contents of birds collected in the Grand Valley, the main food of the species is fruit, swallowed whole, but many spiders are also eaten. The two types of food receive quite different treatment in the digestive tract. Correlated with this, the gullet opens directly into the intestine. Also the stomach, much reduced in size, is simply a weak lateral sac equipped with a muscle controlling its entrance situated where the gullet and intestine meet. The berries needing no preliminary treatment by muscle or digestive juices pass directly from gullet to intestines without going into the stomach. The spiders, on the other hand, go into the stomach for preliminary digestion.

***Dicaeum hirundinaceum* (Shaw)**

Mistletoe Flowerpecker. Length 3½ in. Adult male: upperparts dark, glossy purplish blue; sides of head and neck black; throat and upper breast bright red; centre of lower breast purplish black; flanks olive-grey, centre of abdomen paler; under tail-coverts pale red; iris dark brown; bill black; feet black; wing 51 mm, tail 23 mm, culmen 10 mm, tarsus 12 mm. Female: upperparts blackish grey with a faint gloss; crown and upper tail-coverts with a trace of red; wings and tail black; throat and upper breast yellowish buff, flanks and lower breast olive-grey; abdomen pale yellowish grey; under tail-coverts pale red; wing 48 mm.

RANGE Aru Islands; other subspecies in Australia.

SUBSPECIES IN NEW GUINEA One, *ignicollis* (Gray).

NESTING [For Australian subspecies: nest a neat, pear-shaped, pensile structure with a slit-like entrance on side; composed of animal silk and plant down well felted together; nest suspended from twig of a tree four to twenty-five feet up; eggs three, pure white; size 15·5 × 10·5 mm.]

REMARKS This is an outlying subspecies of the widespread Australian mistletoe bird which is intimately associated with mistletoe (Loranthus), on the berries of which it feeds.

***Dicaeum nitidum* (Tristram)**

Louisiade Flowerpecker. Length 3½ in. Adult male: crown dull red, upper tail-coverts bright red; rest of upperparts glossy green; tail glossy

black; throat white; breast spot red; rest of underparts yellowish olive, paler on centre of abdomen and under tail-coverts; tufts on sides of breast white; iris brown; bill black, base of mandible whitish; feet black; wing 56–59 mm, tail 26 mm, culmen 11 mm, tarsus 14 mm. Female: like male but duller and lacks red breast spot; wing 54–56 mm. Immature: duller and without red.

RANGE Louisiade Archipelago.

SUBSPECIES Two, differing only slightly:
a) *nitidum* (Tristram); Tagula (Sudest) and Misima (St Aignan) Islands; male wing 56 mm.
b) *rosseli* (Rothschild and Hartert); Rossel Island; like *nitidum* but larger and paler; male wing 59 mm.

REMARKS This is a geographical representative of *D. geelvinkianum* and perhaps should be included in that species.

**Key to *Melanocharis* Species**

1 Upperparts black: 2.
Upperparts olive: 4.
2 Tail longer than wing and with much white basally: *M. versteri* (male).
Tail shorter than wing: 3.
3 Pectoral tufts yellow: *M. longicauda* (male).
Pectoral tufts white: *M. nigra* (male).
4 Underparts olive-brown, streaked: *M. striativentris.*
Underparts olive-grey: 5.
5 Tail as long as wing, or longer, and with a white spot near centre of outer rectrices: *M. versteri* (female).
Tail conspicuously shorter than wing; no white spots near centre of outer rectrices: 6.
6 Pectoral tufts white: *M. nigra* (female).
Pectoral tufts yellow: 7.
7 Outer tail feather edged with white: *M. longicauda* (female).
Tail without white: *M. arfakiana.*

***Melanocharis arfakiana* (Finsch)**

Obscure Berrypecker. Length 4½ in. Adults: upperparts brownish olive to greenish olive; underparts olive-grey, whiter on the abdomen, and with yellow pectoral tufts; bill pale horn-colour; feet light grey; wing 62 mm, tail 36·5 mm, culmen 13 mm, tarsus 16 mm.

RANGE Known from two specimens, one taken in Arfak Mountains in 1867 by Bruijn, and one brought in by a native to an Archbold expedition at Matsika, 3,000 ft, in south-eastern New Guinea, in 1933.

REMARKS This is one of the rarest and most obscurely coloured of New Guinea birds. The known specimens are very similar to the females and immatures of *M. nigra* from which they are best distinguished by the pectoral tufts being yellow, not white as in *M. nigra*. Another species, *M. longicauda*, has yellow pectoral tufts but differs from *M. arfakiana* in having a white outer web on the outer pair of tail feathers, and in having the tail slightly longer.

***Melanocharis nigra* (Lesson)**

Black Berrypecker. Length 4½ in. Adult male: colour varies with the subspecies, being (a) entirely shiny blue-black except for white under wing-coverts, pectoral tufts, and greyish white inner margins of rectrices; or (b) like (a) but underparts olive-grey or slaty grey; or (c) like (b) but with green edgings to wing-coverts and remiges; iris brown; bill black; feet grey; wing 64 mm, tail 40 mm, culmen 13 mm, tarsus 16 mm. Female: upperparts olive-green; underparts olive-grey; bill with base of mandible pale; wing 62 mm.

RANGE New Guinea from lowlands up to 4,000 ft, also western Papuan Islands, islands in Geelvink Bay, and Aru Islands.

SUBSPECIES Four, some strikingly different in the male:

a) *pallida* (Stresemann and Paludan); Waigeu; male with underparts grey and whole upperparts black.

b) *nigra* (Lesson); Misol, Salawati and the Vogelkop of New Guinea; like *pallida* but underparts darker grey.

c) *chloroptera* (Salvadori); Aru Islands and south New Guinea (Mimika River to Fly River); like *nigra* but male with wing-coverts and remiges edged green, contrasting with black of back.

d) *unicolor* (Salvadori); Japen, Meos Num, and northern and eastern New Guinea, west on the north coast to Mamberamo River, on south coast to Angabunga River; underparts black.

REMARKS This species, like its near relatives is quick and active in its movements. It was usually seen alone low in the forest. However, we found one tall fruiting tree in the forest to which numbers of individuals were coming to feed. Examinations of stomach contents indicated that while six birds had eaten only fruit, one had eaten small insects and spiders.

***Melanocharis longicauda* (Salvadori)**

Mid-mountain Berrypecker. Length 5 in. Adult male: upperparts black glossed with blue-green on crown and back; outer pair of tail feathers with white outer web for basal three-quarters; white spot on inner web present or absent depending on subspecies; underparts pale olive-grey

tinged yellow especially on flanks and with abdomen paler and yellower; under wing-coverts white; pectoral tufts yellow; iris brown; bill black; feet dark brown; wing 64 mm, tail 53 mm, culmen 13 mm, tarsus 16 mm. Female: underparts like male, but upperparts olive-green; tail fuscous with white in outer web of outer tail feathers and white spot in inner web present or absent in any race; base of mandible pale.

RANGE Mountains of New Guinea, from 3,200 to 5,800 ft.

SUBSPECIES Slight variation in the intensity of colour and the amount of white in the tail allow five races to be recognized:

a) *longicauda* (Salvadori); Vogelkop and Wandammen Mountains.
b) *chloris* (Stresemann and Paludan); Weyland Mountains; like *longicauda* but slightly yellower below.
c) *umbrosa* (Rand); slopes above Idenburg River; like *chloris* but underparts darker.
d) *orientalis* (Mayr); south-eastern New Guinea; like *longicauda* but male with white patch on inner web of outer tail feathers.
e) *captata* (Mayr); Huon Peninsula and Central Highlands; like *orientalis* but with white spot on inner web of outer tail feathers larger, forming a bar.

REMARKS This species is remarkably like the grey bellied race, *Melanocharis nigra nigra*, but has a longer tail, yellow pectoral tufts, and white in the tail. Though common locally, it seems to be absent from considerable areas. At one locality the bird frequently came to feed on the fruit of a tall forest tree, but elsewhere in the forest it was but seldom seen and then it was hopping and flitting about in the shrubbery undergrowth.

### *Melanocharis versteri* (Finsch)

also known as *Pristorhamphus versteri*

Fan-tailed Berrypecker. Length 5½–6 in. Adult male: upperparts black glossed with blue-green on crown, wings and tail; rectrices glossy black with basal half or more white; tail much graduated and upper tail-coverts very long; chin to abdomen clear grey; under tail-coverts black; under wing-coverts and pectoral tufts white; iris brown; bill black; gape yellow; feet black; wing 61 mm, tail 70–75 mm, culmen 15 mm, tarsus 23 mm. Female: coloration quite different from male; upperparts olive-green; white in tail much restricted to a series of spots at about the mid-point; underparts olive-grey paling posteriorly and more yellowish on abdomen with a slight streaked appearance; wing 68 mm.

RANGE Mountains of New Guinea from 4,500 to 10,800 ft.

SUBSPECIES Geographical variation not pronounced, chiefly in shade of underparts and amount of white in tail; four races are recognized:

a) *versteri* (Finsch); Vogelkop; male underparts light grey and white patch in tail 32–38 mm in extent.
b) *meeki* (Rothschild and Hartert); Weyland and Snow Mountains; like *versteri* but darker below; shows altitudinal variation in size.
c) *virago* (Stresemann); Cyclops Mountain, Sepik Mountain, Central Highlands and Huon Peninsula; intermediate between *meeki* and *maculiceps*.
d) *maculiceps* (De Vis); south-east New Guinea and Herzog Mountains; underparts palest and white tail patch largest of any race.

NESTING The nest is a very large structure for the size of the bird, about 80 mm across and 100 mm high, with a deep foundation supporting an open, deep cup with thick walls. The bulk of the nest is of pinkish fluff from fern stems, covered with a layer of fibres which are bound into a smooth outer surface with animal silk. Into this many flakes of a pale tan lichen are stuck. This gives a very smooth, neat, solid nest. It is saddled on to a small branch where it forks. With its decorations, the nest looks like an enlargement of the mottled branch.

REMARKS This berrypecker is usually a solitary bird; rather shy and active. It lives in the middle strata and, more commonly, in the shrubby undergrowth of the forest. However, the raspberry tangles along the mountain trails are also favourite haunts, and as the bird flits away ahead of one, the white patches which appear to be on each side of the tail are good recognition marks. The open, tree-fern dotted grass country on top of the Wharton Range, sometimes far from any forest, is also visited by this species. Its food is usually small fruits, swallowed whole, but insects are sometimes eaten.

Two aspects of this species are of special interest. Birds from higher altitudes are on the average notably larger than those from lower altitudes, as the following data from the north slope of the Snow Mountains show: wing length at 5,700 ft, 52–62 mm; at 7,000 ft, 64 mm; at 9,000 ft, 68–69 mm.

Unlike most passerine birds, the female is larger than the male in both wing length and weight, as the following data from one area show: male wing 59–64 mm, female 66–71 mm; male weight 12·5–15 grams, female 16–20 grams.

### *Melanocharis striativentris* (Salvadori)

also known as *Neneba striativentris*

Streaked Berrypecker. Length 5–5½ in. Adults: upperparts olive-green; underparts olive-grey, many of the feathers edged with pale, whitish or yellowish, giving a streaked appearance especially on lower breast and abdomen; under wing-coverts white or grey; one subspecies with white in proximal portion of rectrices; iris brown; bill blackish brown, gape

orange; feet dark brown. Wing 73 mm, tail 51 mm, culmen 14 mm, tarsus 19 mm.

RANGE Mountains of New Guinea (except Vogelkop) from 3,800 to 7,000 ft.

SUBSPECIES Four:

a) *axillaris* (Mayr); Weyland and Snow Mountains; axillaries and under wing-coverts white; underparts heavily streaked; no white in tail.

b) *striativentris* (Salvadori); Central Highlands and south slopes of mountains of south-eastern New Guinea; like *axillaris* but axillaries and under wing-coverts greyish brown and less heavily streaked below.

c) *prasina* (De Vis) (*M. s. albicauda* is the same bird); north slopes of mountains of south-eastern New Guinea; like *striativentris* but basal quarter of tail feathers white.

d) *chrysocome* (Mayr); Huon Peninsula; like *striativentris* but underparts darker, streaking less pronounced, and slightly larger, wing 75–80 mm.

REMARKS Though some collectors have found the streaked berrypecker common, in most places it seems to be scarce, if not rare.

### *Rhamphocharis crassirostris* (Salvadori)

Spotted Berrypecker. Length 4½ in. Adult male: upperparts olive-green glossed with oil-green; underparts pearl-grey slightly washed yellow; axillaries pale yellow; under wing-coverts yellowish white; iris brown; bill black; feet black; wing 68–72 mm, tail 46 mm, culmen 16–22 mm, tarsus 17 mm. Female: olive-brown, feathers dusky towards tips and with small triangular yellowish white apical spots; underparts dull white mottled with fuscous, centres of feathers giving an obscure spotted appearance; outer rectrices with terminal white spots; basal quarter of tail feathers white in one subspecies; wing 75 mm.

RANGE Mountains of New Guinea, from 3,800 to 7,700 ft.

SUBSPECIES Three:

a) *crassirostris* (Salvadori); Vogelkop and Snow Mountains; small, male wing 68 mm, culmen 16 mm.

b) *piperata* (De Vis); Central Highlands and south-eastern New Guinea; like *crassirostris* but larger, male wing 73 mm; longer billed, male culmen 21–22 mm; and with more white in bases of rectrices, about 20 mm in extent.

c) *viridescens* (Mayr); Herzog Mountains; darker and with smaller white spots than the above.

REMARKS The male of this species resembles *Melanocharis* in colour, but it has a longer and more slender bill; the female with its spotted plumage resembles only the very different, spotted honeyeater, *Xanthotis polygramma*. The spotted berrypecker, which is apparently a forest bird, seems to be one of the very rare New Guinea species.

***Oreocharis arfaki* (Meyer)**

Tit Berrypecker. Length 5 in. Adult male: crown and nape black; back green; remiges black with green edges and inner secondaries each with a large terminal spot in outer web; tail black washed with blue-grey; side of head with a large yellow area; chin to upper breast black; rest of underparts bright yellow with a chestnut wash or patch along mid-line; iris dark brown; bill black; feet black; wing 74 mm, tail 47 mm, culmen 14 mm, tarsus 20 mm. Female: upperparts green, remiges black with green edgings and small yellow spots in terminal part of outer web of inner secondaries; rectrices black, washed blue-grey; area behind eye grey marked with yellowish white; chin, throat to eye and upper breast grey; lower breast and flanks yellow with semi-circular dusky marks near ends of feathers giving a scaled appearance; obscure on yellowish white abdomen; feet flesh-colour.

RANGE Mountains of New Guinea from 5,000 to 9,000 ft.

SUBSPECIES The fact that the birds found in most of New Guinea are separable from the Arfak birds as *bloodi* (Gyldenstolpe 1955) needs to be confirmed.

REMARKS The male of this brightly-coloured berrypecker resembles some of the oriental titmice (*Parus*) in the pattern of its head with a black crown and throat, yellow patch on side of head and orange-yellow breast. Indeed, it was originally described as a titmouse. The species is usually seen in loose parties often containing from fifteen to twenty individuals. This is an active bird and it is continually moving, sometimes in the branches of the taller trees, but more often in the lower substage trees of the mountain forests where it feeds on small fruits which it swallows whole. The birds assemble to feed with other species at certain fruit trees, and there is always a continual coming and going of birds.

***Paramythia montium* (De Vis)**

Crested Berrypecker. Length 8–8½ in. Adults: forecrown and crest, front half of side of head, throat and centre of upper breast black; lines over eye joining a crescent over nape and hind crown grey, or line over eye white, joining a crescent over nape which has feathers white tipped with black; hind neck, sides of neck, sides of head to eye, side of breast and lower breast greyish blue; flanks blue or with yellow; abdomen and

under tail-coverts yellow; back green or olive-brown; tail which is very rounded, grey-blue; iris dark brown; bill black; feet black. Male wing 102–23 mm, tail 93–100 mm, culmen 20 mm, tarsus 31 mm, crest 25–35 mm long. Female wing 98 mm. There is an increase in size with increase in altitude; for example, Snow Mountain males from 7,000 ft measure wing 107 mm, those from 10,000 ft, 115–23 mm.

RANGE High mountains of New Guinea except Vogelkop, from 6,800 to 13,000 ft.

SUBSPECIES Three:

a) *montium* (De Vis); Central Highlands and mountains of south-eastern New Guinea; eye stripe and nape grey; back green; flanks with yellow stripe; tail 100 mm.

b) *brevicauda* (Mayr and Gilliard); Huon Peninsula; like *montium* but tail shorter, 93 mm.

c) *olivaceum* (van Oort); Snow Mountains; line over eye to nape white; nape feathers white tipped with black; back olive-brown; flanks wholly blue.

NESTING The nest is built three to seven feet up in the dense branches of very shrubby trees at the timber line; a deep, loose, untidy cup supported on all sides by the twigs among which it was placed; made of moss-like plants, lichens, and a few semi-woody stems; a scanty lining of fine grass stems, rootlets, and semi-woody stems, and in the bottom of the cup a pad two inches thick of the golden chaff from the bases of tree-fern leaves. A single white egg with dots and small spots of dark browns and secondary greys making a wreath about the larger end and sparingly scattered over the rest of shell; size 29·5 × 21·2 mm. The young has abundant grey down on the upper and undersurfaces of the body. The female alone incubates, but the male stays near the nest, and when she leaves it to feed the male accompanies her. In one fifty-two-minute period the female brooded for four periods of two to seven minutes and was off the nest for four periods of from five to thirteen minutes. Both male and female feed the young.

REMARKS The delicate blues, yellows and greens in the elegant crested berrypecker's plumage, and its black crest make it one of the most attractive New Guinea birds. Though perhaps too subdued in colour to be called really handsome, it harmonizes beautifully with the mossy forests of its high mountain home, where it is abundant. Its yellow crissum and characteristic shape make it easily identifiable even at a distance. The birds are quick and active in movements, not at all shy, and are continually moving among the twigs and branches of the tree-tops, substage and forest edge. They adopt a variety of poses. Sometimes the tail is cocked up, and the crest is raised when the bird is

excited or alarmed, but it is usually depressed. Often the birds explore the tips of twigs as though in search of insects, now right side up, now upside down, and they appear to peck at the twigs, but they never eat anything but small fruits swallowed whole, judging by an examination of stomach contents. This bird is extremely nervous, it snatches a berry here, another there, and then moves on even though other berries are still within reach. The flight is jerky and noisy, and the calls low, short, and frequent.

When not breeding this berrypecker usually goes about in loosely associated bands of from three or four up to ten or twelve individuals, but a count of one party, as it crossed a glade, indicated more than seventy-five birds in the flock. These flocks often included a few other birds of quite different feeding habits, such as the blue-capped *Ifrita*, a warbler *Gerygone*, a honeyeater *Oreornis* and a flycatcher *Rhipidura*. When the birds were breeding, in August and September, they were more often seen in pairs.

The native peoples who visited collecting camps on top of the Wharton Range, found this bird a favourite food. They shot them with their four-pronged arrows, removed the entrails, and strung the birds on a piece of bark fibre by threading through the nostrils.

## Family Zosteropidae *White-eyes*

*(Eighty species, eight species in New Guinea)*

The White-eyes form a family of some eighty species found in Africa, southern Asia, and through the Pacific islands to Australia and New Zealand. They are sociable birds found in the trees, and they often go about in flocks in the forest and shrubbery where small fruits are their main diet. Where fruit is grown commercially, these birds have incurred the enmity of fruit growers because of their attacks on soft fruits, but this is of no importance in New Guinea. In addition to fruit, some insects and spiders are eaten.

These birds are quick and active in their movements, restlessly hopping about on the twigs and flying from branch to branch, not unlike some warblers. White-eyes often give twittering notes and have melodious songs. Just how much the flocks disband at nesting time is an open field for study.

The nest is a cup placed in a fork or slung between the arms of a fork of a twig. The eggs are two to four in number, and unmarked pale blue. It used to be said that the incubation period was ten days, the shortest of any bird, but recent studies indicate it is eleven days or longer, as is the case in many small birds. The newly hatched young have some down on the upperparts. Both parents share nest duties.

The eight species occurring in the New Guinea area show some interesting patterns of distribution. Only three of them occur on the main island of New Guinea, where they are predominantly mountain birds, but two also occur locally near sea level and on some adjacent islands. One form is restricted in the New Guinea area to small islands in Torres Straits, another to certain western islets, and another to the Louisiade Islands, east of New Guinea. Two species are each restricted to a single small island, one on Biak, one on Tagula. This is a help in identifying the species in any one area, for only a few occur in each. Strangely enough, the genus is absent completely from several larger western Papuan Islands: Misol, Salawati, Batanta and Waigeu.

The species in some cases include subspecies with striking differences, for instance, in *Z. minor* and *Z. fuscicapilla*, the top of the head varies from black to olive-green; the eye-ring may vary from just marked to wide and conspicuous in *Z. minor*. Though the white eye-ring is characteristic of most forms, in one, that from Biak, it is completely lacking.

**Key to *Zosterops* Species**

1 No white eye-ring (Biak Island only): *Z. mysorensis.*
White eye-ring present: 2.

2 Throat white (Tagula Island only): *Z. meeki.*
Throat yellow: 3.

3 Breast and abdomen white: 4.
Breast and abdomen yellow: 6.

4 Forehead and more or less of crown brown-black: *Z. minor* (part).
Forehead and crown yellow-green like back: 5.

5 Upperparts pale yellowish green; throat pale yellow (Torres Straits islands only): *Z. p. albiventris.*
Upperparts yellowish green; throat sulphur-yellow: *Z. novaeguineae.*
Upperparts yellowish green; throat golden yellow: *Z. minor* (part).

6 Underparts deep yellow (small western islands only): *Z. chloris.*
Underparts yellowish green: *Z. fuscicapilla.*
Underparts yellow (Louisiade Archipelago only): *Z. griseotincta.*

***Zosterops chloris chloris* (Bonaparte)**

Moluccan White-eye. Length 4¾ in. Adults: upperparts yellowish green, lores and base of forehead yellower; eye-ring white; a dusky spot in front of eye and extending below it; ear-coverts olive-yellow; cheeks, throat, and rest of underparts deep yellow, greener on the sides of body. Wing 58 mm, tail 40 mm, culmen 15 mm, tarsus 18 mm.

RANGE From the Moluccas eastward to a few small islands in Aru Island group (Pulu Babi) and near Misol Island (Schildpad Islands).

REMARKS The Moluccan white-eye is one of a number of species of birds found in the East Indies whose ecological requirements are such that they live only on small islands and normally shun even moderately sized ones.

***Zosterops palpebrosa albiventris* (Reichenbach)**

Torres Straits White-eye. Length 4¾ in. Adults: upperparts light yellowish green; eye-ring white; mark below lores to below eye black; throat and under tail-coverts pale yellow; rest of underparts white tinged grey on lower breast. Wing 58 mm, tail 45 mm, culmen 12 mm, tarsus 16 mm.

RANGE Islands of Torres Straits (Warrior, Deliverance, Cairncross) and small islands off Cape York.

NESTING [Nest a small neat cup of fine grass, etc., bound together with animal silk and lined with fine grass, placed in fork of a tree; eggs two to four, pale bluish green; size 16·5 × 13 mm. Australian data.]

REMARKS This is another species which is restricted in its ecology, and consequently in geographical distribution, to small wooded islands. Whether it is really allied to the wide ranging species of *palpebrosa* or is a race of *Z. chloris* with which it agrees in ecology, is a point to be determined.

***Zosterops fuscicapilla* (Salvadori)**

Yellow-bellied Mountain White-eye. Length 4¼ in. Adults: upperparts greenish olive, rump yellower; forecrown and cheeks fuscous, or olive like back; eye-ring white; auriculars fuscous, lores fuscous or with a fuscous spot; underparts yellowish green, more yellowish on centre of abdomen; flanks and under tail-coverts more or less washed with olive. Wing 60 mm, tail 40 mm, culmen 14 mm, tarsus 16 mm.

RANGE Western New Guinea mountains (Vogelkop, Snow Mountains, and Cyclops Mountains from 3,800 to 6,000 ft), also on Goodenough Island.

SUBSPECIES Two:

a) *fuscicapilla* (Salvadori); mountains of Vogelkop, Snow and Cyclops Mountains; crown, lores, and cheeks fuscous.

b) *crookshanki* (Mayr and Rand); mountains of Goodenough Island; like *fuscicapilla* but crown and forehead olive as back.

REMARKS This is the only one of the three species of white-eyes living on the mainland of New Guinea that has a yellow or yellow-green breast and abdomen. It is a common bird in the forest, moving about actively among the twigs and branches of the treetops in flocks of

considerable size. It is also a characteristic bird of second growth and is even found in isolated shrubs in the mid-mountain grasslands. The bird varies its fruit diet with insects.

***Zosterops mysorensis* (Meyer)**

Biak White-eye. Length 4½ in. Adults: upperparts olive, paler on rump; lores fuscous; no white eye-ring; sides of neck and cheeks grey; underparts white heavily washed grey on upper breast and flanks; under tail-coverts pale yellow. Male wing 62 mm, tail 39 mm, tarsus 18 mm.

RANGE Biak Island.

REMARKS This is the only New Guinea member of the family without a white eye-ring. One bird was secured from a high tree over second growth on a river bank. It was with a small flock of warblers and flower-peckers (Ripley).

***Zosterops meeki* (Hartert)**

White-throated White-eye. Length 4¼ in. Adults: broad white eye-ring; forehead to middle of crown, lores, region below eye-ring, and ear-coverts dusky black, shading into olive-green of body which shades into olive-yellow of rump; ill-defined malar stripe yellow; throat to abdomen white faintly tinged buffy; vent and under tail-coverts yellow. Wing 60 mm, tail 40 mm, culmen 15 mm, tarsus 17 mm.

RANGE Tagula (Sudest) Island, Louisiade Archipelago.

REMARKS This island species is probably a geographical representative of *Z. minor* which has lost the yellow throat; and it is sometimes included as a race of that species.

***Zosterops minor* (Meyer)**

Black-fronted White-eye. Length 4¼ in. Adults: upperparts generally yellowish green; eye-ring varies from very narrow to broad; top of head and forehead varies from black to yellow-green like back (see under subspecies); throat golden yellow; breast and abdomen white, sides tinged grey; under tail-coverts yellow; iris grey-brown; bill black; feet dark grey. Male wing 59 mm, tail 40 mm, bill 13 mm, tarsus 15 mm. Female wing 56 mm.

RANGE Mountains of New Guinea, 1,600 to 4,500 ft, and Japen Island and D'Entrecasteaux Archipelago (recorded from Aru Islands in error as *Z. m. sharpei*).

SUBSPECIES Seven recognized, but additional collecting and study is needed. *Z. atrifrons* of the Moluccas, etc. is perhaps conspecific; *Z. meeki* is sometimes called a race of *minor*. Here it is considered a

species. The subspecies are of two rather different types of coloration with intermediates:

Type 1 With forehead and top of head like back; eye-ring very narrow; back yellow green.

a) *minor* (Meyer); Japen Island and mountains of northern New Guinea (Cyclops, Sepik, and northern slopes of Snow Mountains).

Type 2 Somewhat intermediate between types 1 and 3 in colour of forehead and crown and back:

b) *chrysolaema* (Salvadori); Arfak Mountains and Onin Peninsula (variable populations).

c) *rothschildi* (Stresemann and Paludan); Weyland Mountains.

Type 3 With forehead and more or less of crown blackish, eye-ring broad, and back greener.

d) *gregaria* (Mayr); Huon Peninsula.

e) *tenuifrons* (Greenway); mountains on north coast of south-eastern New Guinea from Herzog to the Hydrographer Mountains, also a similar population on Tamarau Mountains in Vogelkop.

f) *delicatula* (Sharpe); southern slopes of the mountains of south-eastern New Guinea.

g) *pallidogularis* (Stresemann); Fergusson and Goodenough Islands, D'Entrecasteaux Archipelago.

REMARKS This is one of the two white-breasted white-eyes living on the main island of New Guinea. The other is *Zosterops novaeguineae* (see under the latter species for comparisons).

The treetops of the forest and its edges are the habitat of this white-eye where it goes about in small parties of its own kind or in mixed flocks with other species of small birds, such as warblers. On the island of Japen, with forest-clad hills rising to little over 3,000 ft, some mid-mountain birds such as this occur, though they are absent from the nearby New Guinea lowlands and reappear only on the distant mountains.

### *Zosterops novaeguineae* (Salvadori)

Mountain White-eye. Length 4¼ in. Adults: upperparts yellowish green; eye-ring white; throat and under tail-coverts sulphur-yellow; breast and abdomen white, sides more or less tinged grey or brownish; iris grey-brown; bill black; feet grey. Male wing 55–60 mm, tail 40 mm, bill 13–15 mm, tarsus 15 mm. Female wing 53–58 mm.

RANGE Mid-mountains of New Guinea, up to 7,700 ft, in south and north New Guinea occurs locally at sea level; also Aru Islands.

SUBSPECIES Seven recognized on tone of colour, width of eye-ring, size, etc.:

a) *novaeguineae* (Salvadori); Vogelkop (Arfak Mountains).
b) *oreophila* (Mayr); Saruwaged Mountains.
c) *wahgiensis* (Mayr and Gilliard, 1951) (*shawmeyeri* is considered inseparable); Bismarck Mountains.
d) *crissalis* (Sharpe); mountains of south-eastern New Guinea, 3,800 to 7,700 ft.
e) *wuroi* (Mayr and Rand); south New Guinea at sea level (Wuroi).
f) *aruensis* (Mees, 1953); Aru Islands.
g) *magnirostris* (Mees, 1955); north New Guinea coast near sea level, opposite Vulcan (Manam) Island.

REMARKS This bird and *Z. minor* are the two species of white-eyes with white breasts that live on the main island of New Guinea. *Z. minor* has the forehead and crown like the back, or has them blackish; *Z. novaeguineae* never has a blackish crown or forehead. Where *Z. minor* without black in the forehead and crown occurs in company with *Z. novaeguineae* in north and west New Guinea, it can be distinguished by the fact that the throat is a much richer, more golden yellow, not a dull sulphur-yellow as in *Z. novaeguineae*.

Locally this mountain white-eye was common, being seen in flocks in the treetops of the forest and in second growth. Sometimes a few were seen feeding on the fruits of small substage trees in the forest. Stomach contents have included spiders. Like some other predominantly mountain birds, some isolated populations live at low altitudes.

***Zosterops griseotincta* (Gray)**

Louisiades White-eye. Length 4½–5 in. Adults: upperparts yellowish green, eye-ring white; underparts greenish yellow, more olive on flanks; iris brown; bill brown with mandible paler; legs dark grey-brown or pale flesh-colour varying with the subspecies. Wing 60–67 mm, tail 45–50 mm, culmen 17–19 mm, tarsus 18–20 mm.

RANGE Small islands east of New Guinea (Louisiades, etc.) and off the Solomon Islands.

SUBSPECIES IN NEW GUINEA AREA Four:

a) *longirostris* (Ramsey); Heath Island (Rogeia), East and Hastings Islands (Bonvouloir group) and Alacaster Island; bill long; feet dark; culmen 19 mm.
b) *griseotincta* (Gray); Duchateau Island and Conflict group; like *longirostris* but bill shorter, culmen 17 mm.
c) *aignani* (Mayr); Misima (St Aignan) and Deboyne group, Louisiade Archipelago; like *griseotincta* but underparts brighter and more yellowish.
d) *pallidipes* (De Vis); Rossel Island; differs from the above in having pale, flesh-coloured feet.

species. The subspecies are of two rather different types of coloration with intermediates:

Type 1 With forehead and top of head like back; eye-ring very narrow; back yellow green.

a) *minor* (Meyer); Japen Island and mountains of northern New Guinea (Cyclops, Sepik, and northern slopes of Snow Mountains).

Type 2 Somewhat intermediate between types 1 and 3 in colour of forehead and crown and back:

b) *chrysolaema* (Salvadori); Arfak Mountains and Onin Peninsula (variable populations).

c) *rothschildi* (Stresemann and Paludan); Weyland Mountains.

Type 3 With forehead and more or less of crown blackish, eye-ring broad, and back greener.

d) *gregaria* (Mayr); Huon Peninsula.

e) *tenuifrons* (Greenway); mountains on north coast of south-eastern New Guinea from Herzog to the Hydrographer Mountains, also a similar population on Tamarau Mountains in Vogelkop.

f) *delicatula* (Sharpe); southern slopes of the mountains of south-eastern New Guinea.

g) *pallidogularis* (Stresemann); Fergusson and Goodenough Islands, D'Entrecasteaux Archipelago.

REMARKS This is one of the two white-breasted white-eyes living on the main island of New Guinea. The other is *Zosterops novaeguineae* (see under the latter species for comparisons).

The treetops of the forest and its edges are the habitat of this white-eye where it goes about in small parties of its own kind or in mixed flocks with other species of small birds, such as warblers. On the island of Japen, with forest-clad hills rising to little over 3,000 ft, some mid-mountain birds such as this occur, though they are absent from the nearby New Guinea lowlands and reappear only on the distant mountains.

### *Zosterops novaeguineae* (Salvadori)

Mountain White-eye. Length 4¼ in. Adults: upperparts yellowish green; eye-ring white; throat and under tail-coverts sulphur-yellow; breast and abdomen white, sides more or less tinged grey or brownish; iris grey-brown; bill black; feet grey. Male wing 55–60 mm, tail 40 mm, bill 13–15 mm, tarsus 15 mm. Female wing 53–58 mm.

RANGE Mid-mountains of New Guinea, up to 7,700 ft, in south and north New Guinea occurs locally at sea level; also Aru Islands.

SUBSPECIES Seven recognized on tone of colour, width of eye-ring, size, etc.:

a) *novaeguineae* (Salvadori); Vogelkop (Arfak Mountains).
b) *oreophila* (Mayr); Saruwaged Mountains.
c) *wahgiensis* (Mayr and Gilliard, 1951) (*shawmeyeri* is considered inseparable); Bismarck Mountains.
d) *crissalis* (Sharpe); mountains of south-eastern New Guinea, 3,800 to 7,700 ft.
e) *wuroi* (Mayr and Rand); south New Guinea at sea level (Wuroi).
f) *aruensis* (Mees, 1953); Aru Islands.
g) *magnirostris* (Mees, 1955); north New Guinea coast near sea level, opposite Vulcan (Manam) Island.

REMARKS This bird and *Z. minor* are the two species of white-eyes with white breasts that live on the main island of New Guinea. *Z. minor* has the forehead and crown like the back, or has them blackish; *Z. novaeguineae* never has a blackish crown or forehead. Where *Z. minor* without black in the forehead and crown occurs in company with *Z. novaeguineae* in north and west New Guinea, it can be distinguished by the fact that the throat is a much richer, more golden yellow, not a dull sulphur-yellow as in *Z. novaeguineae*.

Locally this mountain white-eye was common, being seen in flocks in the treetops of the forest and in second growth. Sometimes a few were seen feeding on the fruits of small substage trees in the forest. Stomach contents have included spiders. Like some other predominantly mid-mountains birds, some isolated populations live at low altitudes.

***Zosterops griseotincta* (Gray)**

Louisiades White-eye. Length 4½–5 in. Adults: upperparts yellowish green, eye-ring white; underparts greenish yellow, more olive on flanks; iris brown; bill brown with mandible paler; legs dark grey-brown or pale flesh-colour varying with the subspecies. Wing 60–67 mm, tail 45–50 mm, culmen 17–19 mm, tarsus 18–20 mm.

RANGE Small islands east of New Guinea (Louisiades, etc.) and off the Solomon Islands.

SUBSPECIES IN NEW GUINEA AREA Four:
a) *longirostris* (Ramsey); Heath Island (Rogeia), East and Hastings Islands (Basilaki group) and Alacaster Island; bill long; feet dark; culmen 19 mm.
b) *griseotinc*[illegible] (Gray); Duchateau Island and Conflict group; like *longirostr*[illegible] bill shorter, culmen 17 mm.
c) *aignani* [illegible]; Misima (St Aignan) and Deboyne group, Louisiad[illegible] pelago; like *griseotincta* but underparts brighter and more yellowish.
d) *pallidipes* (De Vis); Rossel Island; differs from the above in having pale, flesh-coloured feet.

NESTING The nest is cup-shaped in the fork of ... loosely mad rootlets, fibres and fine grasses, not specially lined b... s, ...sely cove outside with small pieces of wool, bark and animal s...k. E...s ver... blue, unmarked; size 18·5 × 13·3 mm (Hartert).

REMARKS The distribution of bill size in relation to size of islan... which the birds live deserves attention. Small islands often have po... tions of birds with larger bills than those of their nearest relatives adjacent larger islands or the mainland. The reason for this is obsc... but the correlation recurs.

## Family Ploceidae *Weaver Birds, Australian Finches*

*(260 species, sixteen species in New Guinea)*

The 260 species of weaver birds are entirely Old World in distributio with the greatest number of species in Africa, where one finds most the species that make elaborate pendant nests and have evolv peculiar breeding habits such as colony or communal nesting, pol gamy, or social parasitism. However, the family is also well represent in southern Asia and southwards to Australia, by the groups knov as waxbills (*Estrilda*, etc.), grassfinches (*Erythrura*, etc.), and manniki (*Lonchura*, etc.). In Australia most of these birds are known as finc... name used in Europe and America for some members of the relat family of seed-eaters called *Fringillidae*.

Only sixteen species occur in New Guinea, many of which a endemic, but some also occur in Australia. They are small birds, 3¾ 5¼ in. long with thick seed-crushing bills. Two are mostly ...ec..., tw have some red on them, and the rest are covered with black, brown, an white feathers often boldly patterned. A few species favour forests o forest edges, but most are grassland birds, feeding on grass seeds an going about in flocks. The nesting, as far as is known, is similar: th birds pair, the nest is flask-shaped with a side entrance and is placed i a bush or among grass, and the eggs are white.

### Key to Adult Birds

1. Plumage mostly green: 2.
   Plumage without green: 3.
2. Bill larger (culmen from base 18 mm): *Erythr...ra pal...*
   Bill smaller (culmen from base 15 mm): *Erythr...ra*
3. With some red in flan... or face: 4.
   No red in plumage: *L...chura* (see separate ke...).
4. Abdomen white, face red: *Neochmia phaeton.*
   Abdomen and face dusky brown: *Oreostruthus fuliginosus.*

