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SPECIAL CATALOGUE, No. 1.

NESTS AND EGGS OF BIRDS

FOUND BREEDING

IN

AUSTRALIA AND TASMANIA,

BY

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INTRODUCTION.

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THE present and third Volume contains descriptions of the Nests and Eggs of one hundred and ten species of Australian and Tasmanian Birds, and is partly based on the collections in the Australian Museum, and the remainder chiefly on private collections. The birds enumerated form the concluding portion of the Order PICARLE, consisting of the Family CUCULIDÆ, and the Families LORIDÆ and PSITTACIDÆ, of the Order PSITTACI, the numerous members of the Family FALCONIDÆ of the Order ACCIPITRES, and the sole representative of the Sub-Order PANDIONES, and the Families BUBONIDÆ and STRIGIDÆ of the Order STRIGES. Included in it are also the Families PHALACROCORACIDÆ, SULIDÆ, FREGATIDÆ, PHAËTHONIDÆ and PELLICANIDÆ of the Order STEGANOPODES.

By the loan of specimens and the contribution of information, considerable assistance has been received from many valued correspondents in different parts of Australia and Tasmania, whose names appear in the work. With some few exceptions the nomenclature, as in the preceding volumes, is similar to that of the authors of the "Catalogue of Birds in the British Museum," and the late Dr. R. Bowdler Sharpe's "Hand-list of Birds," and to whom I here acknowledge my indebtedness.

The figures of eggs, which are of the natural size, have been reproduced by the heliotype process at the Government Printing Office, from photographs of the originals taken under the direction of the Government Printer, Mr. W. A. Gullick, and the personal supervision of Mr. A. E. Dyer.

The original drawings of birds, from which the figures have been reproduced, were made by the late Mr. Neville Cayley, who also coloured the plates of eggs in the coloured copies. The photographs of nests, nesting-places and breeding haunts are the work of the Museum Photographer (Mr. H. Barnes, Junr.), the late Mr. H. P. C. Ashworth, Mr. F. P. Austin, Mr. C. G. Gibson, Dr. W. Macgillivray, Mr. P. R. Pedley, Mr. G. Savidge and myself.

A.J.N.

SYDNEY, September, 1912.

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Sub-order COCCYGES.

Family CUCULIDÆ.

Sub family CUCULINÆ.

Genus CUCULUS, *Linnaeus.*

Cuculus inornatus.

PALLID CUCKOO.

Cuculus inornatus, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 297 (1826); Gould, Bds. Austr., fol. Vol. IV., pl. 85 (1848).

Cucumantis pallidus, Gould, Handb. Bds. Austr., Vol. I., p. 615 (1865).

Cuculus pallidus, Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 261 (1891); Sharpe, Handl. Bds., Vol. II., p. 159 (1900).

Cuculus variegatus, Hartert, Nov. Zool., Vol. XII., p. 217 (1905).

ADULT MALE—*General colour above ashy-brown, slightly paler on the forehead, snicicut and lower back; upper tail-coverts ashy-brown, some of the concealed ones slightly notched on their margins with dull white; under wing-coverts and secondaries like the back, with dull white-brown margins; remainder of the upper wing-coverts, primary coverts and quills brown, the inner webs of the primaries notched or barred with white, the basal portion of the inner webs of the secondaries wholly white; upper edge of the wing white; tail feathers blackish-brown, notched on both webs and tipped with white; on the nape a spot of white; ear-coverts and a line extending along and down behind them, brown; sides of the neck and all the under surface stone-grey, passing into white on the centre of the abdomen and under tail-coverts; bill dark olive-brown, yellowish at the base of the lower mandible; orbital ring yellow; gape reddish-orange; legs and feet olive, the latter grey below. Total length in the flesh 1.3 inches, wing 1.8, tail 0.8, bill 0.76, tarsus 0.8.*

ADULT FEMALE—*Similar in plumage to the male.*

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Tasmania.

OVER nearly the whole of the Australian continent and Tasmania the Pallid Cuckoo may be found at one season of the year or another. In "Novitates Zoologica" Dr. Ernst Hartert pointed out in January, 1905, that Latham's *Columba pallida* of his "Index Ornithologicus" was founded on the "Pale Pigeon" of the "General Synopsis of Birds," and is not applicable to the well-known Pallid Cuckoo of Australia and Tasmania. In his "History of the Collections contained in the Natural History Departments of the British Museum," Birds, Dr. Sharpe informs us that Latham's name was founded on one of Watling's coloured drawings of the "Pale Pigeon," and as Dr. Sharpe remarks:—"Although this figure is very incorrect, I am inclined to think that it is intended for *Topholemus antarcticus*."

As there appears from Dr. Hartert's remarks to be some uncertainty also about the propriety of using the name of *Cuculus variegatus*, Vieillot, which he substitutes for Latham's name, I think it would have been better, when changing it, to have given it the first specific

name applied, when no doubt could possibly exist as to the species it was intended for in the description. At least there would have been a greater chance of finality being assured in the nomenclature. According to Packeran, Vieillot's description of *Cuculus cinereus*, given on the same page as that of *C. variegatus*, was founded on a specimen from New Holland. Vigors and Horsfield's description of the Pallid Cuckoo (under the name of *Cuculus inornatus*) is unmistakable, and as under this name it is beautifully figured by Gould in his folio edition of the "Birds of Australia," I prefer to use Vigors and Horsfield's specific name of *inornatus* in preference to either of Vieillot's older, but uncertain, names of *variegatus* and *cinereus*.

Although the Pallid Cuckoo is so generally distributed over most parts of Australia, it is commoner in the coastal districts than inland, and is more frequently met with in the eastern portions of the continent during the spring and summer months. In the neighbourhood of Sydney this species arrives at the latter end of August, or early in September, and usually takes its departure about the end of March. Others remain until the end of April ere they retire north, and in some seasons a few birds remain throughout the winter if mild weather prevails: as a rule the latter birds, however, are silent or nearly so. The Pallid Cuckoo more nearly approaches a true migrant than any other member of the family *Cuculidæ* frequenting the neighbourhood of Sydney. In 1893, a normal season, I saw a Pallid Cuckoo on the 2nd July, but did not hear one call until the 1st September. At Ashfield and Roseville I first heard the call of this species in 1896-7-8, on precisely the same date of the month, the 28th August. In the latter locality I first heard it on the 6th September.

The Pallid Cuckoo frequents open forest and cleared lands, also orchards, cultivated lands and vineyards. Usually it is met with alone, except during autumn, when three or four may often be seen chasing each other, and at the same time uttering loud, shrieking, discordant notes, which, together with the size and colour of the birds, often arrest the attention of even casual observers: these notes are entirely different from its spring and summer notes. It is very fond of perching near the end of a dead branch, or on top of a fence, or a telegraph wire. Its flight is usually straight and rapid, and often alighting it has a curious habit of elevating the tail.

The loud but somewhat plaintive note of this species, which is repeated from about eight to eleven times, and varied occasionally with a few harsh notes, may be heard from sunrise to sunset, and in the late spring and summer frequently through the night.

All the Cuckoos are extremely useful birds, and are indefatigable destroyers of large numbers of insects and their larvæ, and particularly when the larvæ are in the latter stage of their existence. Caterpillars form the staple article of diet of the Pallid Cuckoo, the majority of the stomachs of the birds examined being distended with them, the flattened skin of one taken from the stomach of an adult male shot by me at Toongabbie on the 21st September, 1899, measuring three inches and a half in length, by half an inch in width. The walls of the stomach are thick and muscular, and they have a thick hairy lining, but when closely examined and carefully washed, this will be found to consist chiefly, if not entirely, of the fine hair-like bristles from the larvæ of insects. This species is also fond of grasshoppers, which, combined with its hawk-like flight, has gained for it in many parts of New South Wales the local name of "Grasshopper Hawk." Where the Pallid Cuckoo, and also all the resident species of Cuckoos so common around Sydney, are so useful to orchardists, is that they devour large numbers of injurious leaf-eating larvæ, that attack the fresh and tender young leaves when the fruit trees first assume their foliage.

Dr. A. M. Morgan writes me from South Australia as follows:—"I have met with Pallid Cuckoos as far north as Laura, where they arrive about the middle of July. They are purely birds of passage in that district, never, as far as I could ascertain, remaining to lay, as I

never found an egg or saw a fledgling, nor did I ever hear of any. They arrive in and about Adelaide towards the end of July, a few stray ones somewhat earlier. The great majority do not lay here, but pass on to the Eastern States; a few, however, do stop, for I have seen one egg taken here, and have seen two fledglings. Each of them had been fed by a pair of *Ptilotis penicillata*; in one case a pair of Sparrows was also assisting. Between 1880 and 1885 I took numbers of the eggs of this bird between Geelong and Queenscliffe. The only four birds I have found acting as foster parents are, *Ptilotis penicillata*, *Myzantha garula*, *Anthochaera carunculata* and *Meliorus nova-hollandia*."

Mr. A. F. B. Hull, of Freshwater near Manly, New South Wales, sends me the following notes relative to nests in which the eggs of this species have been found by himself, or in his presence:—"A nest of *Artamus sordidus* in the Domain, Hobart, on the 23rd November, 1890, was placed where a broken branch, projecting from a *Eucalyptus globulus*, and pieces of bark formed a support, about six feet from the ground, contained two eggs of *A. sordidus* and one of the Pallid Cuckoo, all fresh. Another was in a nest of *Glyciphila fulvifrons*, containing one egg of that species, and one egg of the Pallid Cuckoo, slightly incubated. A third egg was found in a nest of *Ptilotis chrysofs*, at Freshwater, near Manly, 28th December, 1905, containing one egg of that species and one of the Pallid Cuckoo. The nest was in a tea tree.

"During the 1907 season a *Ptilotis chrysofs* built, on the 28th September, in a *Monotoca elliptica*, close to my cottage at Freshwater. She hatched two young ones on the 27th October, which were taken by a cat or other marauder. She then commenced to build on the 9th November, in the top of a *Casuarina* in front of the house. On the 23rd November the nest contained one egg of *C. pallidus*. The Honey-eater then deserted the nest without laying, and built again in a tea tree on the next allotment. On the 1st December this nest contained one egg of *Ptilotis chrysofs* and an egg of *C. pallidus*, but during the week some stranger robbed the nest.

From Melbourne Mr. G. A. Kearnland writes me as follows:—"With the approach of spring the Pallid Cuckoo makes its appearance in Victoria. Those arriving first utilise insectivorous birds as foster parents for their young, whilst later comers deposit their eggs in the nests of Honey-eaters. I have found them in the nests of the following birds:- Oriole, Mud Lark, Wattle Bird, Scarlet-breasted Robin, White-plumed, Yellow-tufted and Yellow-faced Honey-eaters. In North-western Australia I saw them as early as June, and in August took an egg of this species from the nest of *Oreoca cristata*. Whilst returning to my home in Carlton in the morning, I have frequently heard the notes of the Pallid Cuckoo as early as 3 a.m. and as late as 9 p.m. Whatever else they consume they are very fond of caterpillars."

Mr. E. H. Lane, of Orange, New South Wales, informs me that he has taken a Pallid Cuckoo egg with sets of each of the following species:—*Ptilotis fusca*, *P. auricomis*, *P. penicillata*, and also has them in his collection taken with *P. lewinii* and *Myzantha flavigula*.

Mr. H. L. White, of Belltrees, Scone, writes me that he has the egg of the Pallid Cuckoo, taken in the nest of *Myzantha obscura*.

Dr. W. Macgillivray sends me the following note from Broken Hill, South-western New South Wales:—"Pallid Cuckoos are never numerous in this dry country, owing to the scarcity of their natural food during many seasons. Occasionally a season comes along when caterpillars are numerous; such an one was the Spring of 1905, when I saw more of these birds than any year before or since. They arrived in June 1901, a good and early season, none during the next two years, then they appeared in August and September of 1904, and July and August in 1905. Last year I did not see or hear any, and none so far this year. In the Cloncurry [District, Northern Queensland, this species was there during the greater part of the year. A few Pallid Cuckoos remain here the whole year, but are most plentiful in the spring. Their eggs have been noted here in the following nests:—Fuscous Honey-eater, Friar Bird, Dusky Wood

Swallow, Black and White Fantail. While the following birds have been noted feeding young Pallid Cuckoos:—Rufous-breasted Thickhead, Yellow-throated Friar Bird, and Lanceolated Honey-eater.”

Mr. Geo. F. Hinsby sends me the following notes from Queenstown, South-western Tasmania:—“As far as my experience goes the Pallid Cuckoo lays in the nests of the following species:—Brush Wattle Bird (*Amellobia mellivora*), Black-capped Honey-eater (*Melithreptus melanocephalus*), Strong-billed Honey-eater (*M. validirostris*), Spine-billed Honey-eater (*Acanthorhynchus dubius*), Yellow-throated Honey-eater (*Ptilotis flavigula*), and Tasmania Honey-eater (*Lichmera australasiana*). The Pallid Cuckoo does not frequent the west coast of Tasmania.”

Mr. J. Gabriel writes me as follows from Abbotsford, Victoria:—“I found an egg of the Pallid Cuckoo in the nest of the White-eared Honey-eater (*Ptilotis leucotis*). The Cuckoo's egg was laid first, and I waited for over a fortnight before the Honey-eater had laid her two eggs; prior to doing so, however, she had completely covered the Cuckoo's egg with a thick layer of nesting material.”

From Broome Hill, South-western Australia, Mr. Tom Carter sends me the following note:—“As soon as the winter rains set in in North-western Australia, the peculiar cry of the Pallid Cuckoo could be heard all day, and frequently also through the night. Female birds were rarely observed. A recently fledged bird was shot near Point Cloates on the 14th December, 1900. At Broome Hill they are one of the commonest species in the winter and spring months, arriving in May. At Burelton, on the Vasse River, on the 16th December, 1902, a fledgling was being fed by *Ptilotis sonara*, and another by *Melithreptus chloropsis*.”

Mr. Edwin Ashby sends me the following note from South Australia:—“The Pallid Cuckoo visits Adelaide in considerable numbers in August and September, staying on well into the summer. The eggs are apparently rare here, or are passed over by collectors.”

From Glenorchy, Tasmania, Mr. Malcolm Harrison writes me that he has taken the eggs of the Pallid Cuckoo from the nest of the acclimatized Goldfinch (*Carduelis elegans*), and that Mr. A. L. Butler has taken an egg from the nest of each of the following species:—Dusky Wood Swallow (*Artamus sordidus*), Garrulous Honey-eater (*Myzantha garrula*), and the Dusky Robin (*Amorodryas vittata*). Mr. Russell Young, Junr., has found it in the nest of the Brush Wattle Bird (*Amellobia melanora*), and Mr. A. E. Brent from the nest of the Black-capped Honey-eater (*Melithreptus melanocephalus*).

Writing of this species feeding its own young, Mr. M. Harrison sends the following note:—“I believe the matter of the Cuckoo feeding its own young has been fully threshed out from time to time, but it was only on one occasion I ever witnessed it. On the 21st December, 1900, I saw a Pallid Cuckoo on the hill opposite Woodbury House, which is in the Midlands, and about half way between Hobart and Launceston, feeding a young bird of the same species. The young one could just fly, and allowed me to get within a few feet of it. The parent bird seemed to make a great fuss over it, and kept up a peculiar whistling cluck. I distinctly saw her feeding the young one, and no other bird seemed to have anything to do with it. The hill in question at Woodbury is clothed with old She-oak trees (*Casuarina*), in the cracks of which *Artamus sordidus* nest freely, so it is probable that the foster parent was of this species.”

Mr. S. Robinson informs me that he has, among others in his collection, the eggs of the Pallid Cuckoo taken with sets of the following species:—*Lalage tricolor*, *Melanodryas bicolor*, *Rhipidura rufifrons*, *Myiagra nitida*, *Pachycephala glaucura* and *Anthocheera carunculata*.

Dr. Lonsdale Holden, while resident at Bellerive, near Hobart, Tasmania, made the following notes:—“12th September, 1895, saw a Pallid Cuckoo in a paddock opposite my garden; it was loudly calling, and flying from post to post, and on to the ground to pick up insects. On the 23rd September, 1897, I saw a Pallid Cuckoo for the first time this season; it

was on the open grass land in Beltana Village. The common call of this Cuckoo begins with four quick notes on A above the treble clef, and makes eleven intervals up to D; sometimes it stops half way. Mr. May, of Sandford, informed me that Pallid Cuckoos were numerous in that locality in 1903, and that he frequently found eggs in the numerous nests of the Goldfinch (*Carduelis elegans*),”

The Pallid Cuckoo deposits its eggs, in common with other members of the family *Cuculidæ*, in the nest of another bird, but principally in the open cup-shaped nest of a Honey-eater, upon the rightful owner of which devolves the task of incubating the egg and rearing the newly hatched intruder. The latter duty is often more laborious than attending to the wants of an entire brood of young ones, for all young Cuckoos apparently have insatiable appetites. Sometimes the young Cuckoo is attended to by two or more species, and occasionally by adult Cuckoos. The Pallid Cuckoo always selects an open cup-shaped nest wherein to deposit its egg, Honey-eaters being more favoured than others in this respect, probably because their nests are less concealed and more easily found. In the neighbourhood of Sydney I have more often found the egg of this Cuckoo in the nests of the Yellow-tufted Honey-eater (*Ptilotis auricomis*), the Yellow-faced Honey-eater (*P. chrysoptis*), and the Lunulated Honey-eater, or “Black-cap” (*Melithreptus atricapillus*), and far less frequently in the nest of Lewin’s Honey-eater (*Ptilotis lewinii*) and Fuscous Honey-eater (*P. fusca*). Inland the nests of the White-eared Honey-eater (*Ptilotis leucotis*), the White-plumed Honey-eater (*P. penicillata*), and the Singing Honey-eater (*P. sonora*) are frequently selected as convenient receptacles for the eggs of the Pallid Cuckoo. They may, on rare occasions, be found also in the nests of the different species of Wood Swallow, the Rufous-breasted and the Yellow-breasted Thickheads, Olive-backed Oriole and Magpie Lark. At various meetings of the Linnean Society of New South Wales, I have exhibited sets of eggs consisting of an egg of the Pallid Cuckoo with eggs of the following species:— Harmonious Shrike Thrush (*Collyriocincla harmonica*), Fulvous-fronted Honey-eater (*Glyciphila fulvifrons*), Warty-faced Honey-eater (*Meliphaga phrygia*), and Yellow-throated Miner (*Myzantha flavigula*). As a rule it will be found that the eggs are deposited in the nests of birds about one half its own size. I first found the eggs of this Cuckoo in the nest and with an egg of *Melithreptus atricapillus*; this species, however, sometimes outwits the Pallid Cuckoo. Mr. Frank A. Shelley brought me a nest for examination from which he had successfully scooped two eggs of the Lunulated Honey-eater, and then cut off the branch in the leafy end of which the nest was built. On looking into the nest, which had fallen a distance of forty feet, he was surprised to find an egg of the Pallid Cuckoo almost completely embedded in the lining material at the bottom of the structure, which subsequently I removed. Mr. R. Burfoot, at Roseville, also found a broken egg of the Pallid Cuckoo beneath the nest of the White-shouldered Caterpillar-eater (*Lalage tricolor*), which had evidently been turned out by the owners of the nest.

A pair of Short-billed Honey-eaters (*Melithreptus brevirostris*) reared a young Pallid Cuckoo in a nest built in a tree adjoining the fence of my house at Roseville. I caught this fledgling on the 6th January, 1904, and procured both of the foster parents, and they now form one of the groups in the collection of the Australian Museum.

The mode of ejection of other young birds that may be occupants of the same nest, when the young Cuckoo is hatched, has been witnessed many times, and is always performed in the same manner. It must be instinct that induces a callow and apparently helpless Cuckoo, only comparatively a few hours old and with eyes unopened, to successfully wriggle itself beneath each other occupant, one by one, until it gets the young bird on its back, and by dint of perseverance ejects it over the side, or out of the entrance of the nest. How seldom, too, even at this early stage of the young Cuckoo’s existence, does one find that it is not the sole occupant of the nest. I have often gone a little distance out of my way to examine

a nest of the Yellow-tufted Honey-eater, which previously had contained two or three fresh eggs, but on visiting it some four weeks later found it completely filled with a nearly fledged young Pallid Cuckoo, which hardly exhibited any concern until it was reluctantly compelled to give up possession of the nest, while undergoing a close examination.

The eggs of the Pallid Cuckoo are oval-rounded, or elongated-oval in form, the shell being close-grained, smooth and slightly lustrous. They are of a uniform flesh colour, some specimens having a few dots of a darker hue scattered over the shell. Four eggs taken respectively from the nests of *Ptilotis auricomis*, *Melithreptus brevirostris*, *Pachycephala rufiventris* and *Meliphaga phrygana*, measure as follows:—Length (A) 0.99 × 0.7 inches; (B) 0.97 × 0.68 inches; (C) 0.96 × 0.7 inches; (D) 1.0 × 0.71 inches.

A nestling in the collection of the Australian Museum, bred in the nest of *Ptilotis auricomis*, from an egg placed there by Dr. Ramsay, in 1864, is in general colour dull white above, and below the feathers mottled or broadly streaked with blackish-brown, the forehead and a broad band down the wing blackish brown, the inner portion of the wing slightly washed with fulvous; chin, cheeks and throat brown, the latter with darker brown centres to the feathers. Total length 4.2 inches, wing 2.1 inches. An almost similar stage of plumage is exhibited by fledgelings, and by quite young birds, but the upper parts are more distinctly washed with fulvous, and which also extends to the crown of the head, hind neck and upper back; all the quills are brown, the primaries conspicuously margined around their tips, and notched on their inner webs with white, the secondaries broadly margined or toothed on their outer webs with white, and these patches are washed with fulvous. Total length 8.5 inches, wing 5.2 inches.

Immature birds are brown above, mottled or margined, especially on the head and hind neck and wings, with light rufous; below ashy brown; under tail-coverts with indistinct, dull dark-brown barrings in the lower flanks and under tail-coverts. Total length 12.6 inches, wing 7.5 inches. Some immature specimens exhibit, more or less, the light rufous and black also on the foreneck. There are very few adult birds, even in breeding plumage, that do not show traces of pale rufous markings more or less below the white nape spot.

In the neighbourhood of Sydney the eggs of the Pallid Cuckoo are seldom found before the end of September, or first week in October, but are far more common during the following month, and I have taken them at Canterbury and Belmore as late as the 14th and 18th January.

Genus CACOMANTIS, Muller.

Cacomantis flabelliformis.

FAN-TAILED CUCKOO.

Cuculus flabelliformis, Lath., Ind. Orn., Suppl. II., p. xxx. (1801); North, Ibis, 1905, p. 54.

Cuculus cineraceus, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 298 (1826); Gould, Bds. Austr., fol., Vol. IV., pl. 86 (1848); *id.*, Hand-bk. Bds. Austr., Vol. I., p. 618 (1865).

Cacomantis flabelliformis, Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 266 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 160 (1900).

ADULT MALE.—*General colour above dark slaty-grey with a very slight greenish gloss, the wings brownish-grey, with an oblong spot of white towards the inner base of the webs of all the quills, edge of the shoulder white; upper tail-coverts slightly darker than the back; tail feathers bluish-black, tipped with white, the margins of the central pair narrowly edged and notched with white, the latter increasing towards the lateral feathers, which are brownish and have their inner webs with whitish bars running across to the shaft, and their outer webs narrowly edged and slightly toothed with white;*

forehead, lores, chin and upper throat greyish, ear coverts dark slaty-grey with whitish shaft streaks; lower throat and remainder of the under surface pale cinnamon rufous, becoming slightly lighter on the lower abdomen and under tail coverts; bill black, flesh colour around the base of the lower mandible; legs and feet yellowish-olive; eyelid bright yellow; inside of mouth reddish-orange; iris dark brown. Total length in the flesh 10·7 inches, wing 5·6, tail 5·9, bill 0·55, tarsus 0·75.

ADULT FEMALE.—Somewhat similar in plumage to the male, but smaller, and having the under parts paler and showing traces on the lower breast of numerous very indistinct, narrow, transverse brown barrings to the feathers. Wing 5·3 inches.

Distribution.—Queensland, New South Wales, Victoria, South Australia, Western Australia, North-western Australia, Tasmania.

IN the January number of "The Ibis" for 1906, I pointed out that the name of *Cuculus flabelliformis* appears to have been erroneously applied by writers in general. This name was founded upon the "Fan-tailed Cuckoo" of Latham's "General Synopsis of Birds," his description of the tail of the latter being as follows:—"The tail is greatly cuneiform; the two middle feathers black; the others the same on the outer webs, but barred on the inner with alternate black and white." Latham's figure, too, on Plate cxxvi., agrees with his description, showing that the outer webs of the outermost feather on both sides—the only feathers with the outer webs visible—are unbarred, and that the inner webs are only toothed or notched about half way across, and not barred right across to the shaft. Since writing the above I have received a copy of "The History of the Collections contained in the Natural History Departments of the British Museum," Birds, by Dr. R. Bowdler Sharpe, and he there refers Latham's description to *Cacomantis flabelliformis* of the "Catalogue of Birds in the British Museum," and points out that Latham had taken both his description and figure from one of Watling's drawings, "but his plate represents the bird as of a deeper red colour underneath than in Watling's picture, which may have faded a little: the latter writer says that the figure was of the natural size." It is the type of the species.* One can discern that Latham had never taken his description from a specimen, as he remarks of the Fan-tailed Cuckoo,—“This elegant bird is about the size of a Song Thrush, and ten inches in length, the tail occupying at least one third,” whereas the length of the tail is slightly over one half of the total length. As I have pointed out, Latham's description and figure of *Cuculus flabelliformis* agrees with Gould's very accurate description and figure of *Cuculus imperator*, in his folio edition of the "Birds of Australia." Many, however, of Latham's inaccurate and misleading descriptions were founded only on a drawing or painting of a bird, might well be relegated to oblivion, for it is hardly fair that one who has accurately described and figured a species from the actual specimens, as for instance Gould has so often done, should have to give way so far as nomenclature is concerned to one who has taken his description from, perhaps, a very indifferent painting, of which he has no means of gauging its accuracy, nor has he ever seen the bird he vainly attempts to convey an idea of to others, and for which his name is to stand as the authority: *C. palliolatus* is another instance of Latham's misleading descriptions, and which is also taken from a painting of Watling's. As the specific name of *C. flabelliformis* is founded only on a painting, it would be better to discard it altogether, as there is some doubt from the description and figure to which species (the Fan-tailed or Brush Cuckoo), it is intended to apply. To do this, however, would only tend to confuse the nomenclature, and I think that it is better to let the name of *C. flabelliformis* stand for the species to which it has been generally applied. The Fan-tailed Cuckoo is distributed at one season or another throughout the greater portion of Eastern, Southern and Western Australia, and is likewise a spring visitant to Tasmania. In the Australian Museum collection there are skins of this species from many of the coastal districts from Cooktown in the north-eastern portion of Queensland to King George's Sound in the south-

* Ibis, p. 54 (1906).

western part of Western Australia. During a few weeks stay in Tasmania, towards the latter end of 1906, I frequently met with it on Mount Wellington, also *Lamprocoecya flagosus* and *L. basalís*.

There is a variation in the depth of colour of the under parts in adult specimens. In the neighbourhood of Sydney it is a resident species, and is found throughout the year, and of the six species found near the metropolis, it is one that least makes its presence known by its notes, and is of most unobtrusive habits. It frequents open forest lands, cultivation areas, scrub and brush lands, and the wooded sides and gullies of mountain ranges. In common with the preceding species the flight of the Fan-tailed Cuckoo is somewhat laboured, and it elevates its tail directly it alights. Post and rail fences are its usual resting places about paddocks and orchards, and in the brush more often near the end of a dead lateral branch of a tree. At Roseville, Middle Harbour and Manly I have obtained these birds principally in July and August, and have found the egg in the nest of *Acanthiza pusilla* on the 6th of the latter month.

The stomachs examined contained principally the larvæ of insects.

In the neighbourhood of Sydney the egg of the Fan-tailed Cuckoo is more often deposited in the nests of *Acanthiza pusilla*, *Chthonicola sagittata*, *Sericornis frontalis*, and *Origma rubricata*. In the brushes to the north of the Hawkesbury River, and extending to the Tweed River, *Sericornis magnirostris* is often selected as a foster parent, and far less frequently *S. citreogularis*, and although the former species more often relines the deserted tenement of the latter than it constructs a nest of its own, it is remarkable that the Fan-tailed Cuckoo's eggs are found far more frequently with the eggs of *Sericornis magnirostris* than they are with *S. citreogularis*. I first found the Rock Warbler to be a foster parent of this Cuckoo while nesting at Chatswood in company with Mr. C. G. Johnston and Mr. D. Swift, my attention being drawn to it by the actions of a pair of Rock Warblers. I observed them enter several times, with food in their bills, a recess in the rocky sides of a gully close to a small waterfall, fly out again, and then return with more. On examining the floor of this small cave shelter I found a fully fledged young Fan-tailed Cuckoo being fed by a Rock Warbler, and close by the nest of the foster parent in which it had been reared, and probably torn down by its own weight. Since then I have frequently found the eggs of the *Cacomantis flabelliformis* in the nest of the Rock Warbler. Sometimes it was deposited before the nest was completed, at other times when one or more eggs of the rightful owner had been laid, and on several occasions I have found a fresh egg of this Cuckoo, after young birds had left the nest. Twice the nests, containing each a Cuckoo egg, were built in recesses in the rocks where the Cuckoo would have to fly through the spray of a waterfall in order to deposit its egg, and on two occasions I have found new nests of a Rock Warbler each containing one of this Cuckoo's eggs, and lying on the floor of the shelters, and probably torn down by the weight of the Cuckoo when depositing its egg. I have only on two occasions found more than two Rock Warbler's eggs in the nest when it also contained a Cuckoo. *Cacomantis flabelliformis* is the only species of Cuckoo I have found that utilised the usually well hidden nests of the Rock Warbler. Frequently the chambers to which the top of the pendant domed nests of *Origma rubricata* are suspended, have been so gloomy that I have had to light a match to discover the nest.

The nest of the Buff-rumped Thornbill (*Geobasilens regnoides*) is also frequently utilized by the Fan-tailed Cuckoo wherein to deposit her eggs. I found the egg of this Cuckoo on one occasion only in the nest of Lambert's Superb Warbler (*Malurus lamberti*), but have in several instances found the egg, or a young Cuckoo in the nest, of the White-fronted Scrub Wren (*Sericornis frontalis*). I discovered one remarkably well concealed nest of this species only by the actions of the birds. Passing quietly along a bridle track through the scrub at Middle Harbour, on the 27th September, 1906, I noticed a White-fronted Scrub Wren almost at my feet. The ground around this scrub was covered with a thick carpeting of gum-leaves from the

trees towering overhead. All at once the bird, from which I had momentarily taken my gaze, had mysteriously disappeared from sight. Going down on my hands and knees I flushed the bird, and discovered a small tunnel four inches in length under the leaves, and leading to the entrance of the nest of a *Sericornis frontalis*; removing the leaves, I found a recently hatched young Cuckoo, not probably more than twelve hours old, lying dead just outside the entrance, and most likely, judging by its size and the number of species in the neighbourhood, *Lamprocoecyx basalis*. To find out what had been the cause of this early termination of its existence, the inside of the nest was examined, and I drew forth a pink and grey soft pulpy mass, with eyes yet unopened, and probably not more than a few hours older than its nest mate, which it had ejected; but it was considerably larger and stronger, and when fully fledged, a young Fan-tailed Cuckoo left the nest. How two species of Cuckoos managed to discover so well concealed a nest, being entirely covered with leaves, I know not, except like myself by watching the actions of the owner. A false step of a foot on one side of the track, by either man or horse, would have crushed the nest and contents. Upon the Streaked Warbler (*Chthonicola sagittata*), another ground frequenting species, often devolves the duty of hatching the egg and rearing the young of the Fan-tailed Cuckoo. Undoubtedly *Acanthiza pusilla* is the commonest foster parent of *Cacomantis flabelliformis* near Sydney, and next to that species the Rock Warbler. Of the many nests of *Malurus* examined, I have never found it in that of the commonest species, *Malurus australis*, and only once in that of *M. lamberti*.

From Adelaide, South Australia, Dr. A. M. Morgan writes me as follows:—"It is a remarkable thing that *Cacomantis flabelliformis* does not lay in South Australia, and *Cuculus pallidus* only rarely. *Lamprocoecyx flagosus* and *L. basalis* lay freely. I have never found, or heard of anyone finding, a Cuckoo's egg in the neighbourhood of Laura. The late Mr. M. Murray, who collected there for many years, told me he had also never found, or heard of one, in that district, though four species *C. flabelliformis*, *C. pallidus*, *L. flagosus* and *L. basalis* were common in the spring, and *M. osculans* was occasionally found. I have always considered it the usual thing to find a short clutch when a Cuckoo's egg was present in the nest, at least that is my experience with *C. pallidus*, *L. flagosus* and *L. basalis*. I have often wondered whether the Cuckoo destroyed or ate an egg, or whether the female of the host laid one short. A single example of *Cacomantis flabelliformis* remained about a garden at Laura throughout the winter of 1895, and I was given a dead bird shot in the same locality in April of the same year. These were the only two seen by me in that district. They pass through the Adelaide district in considerable numbers about the end of May and early part of June, on the way eastward. They do not lay here, nor have I ever seen them on their way back."

Mr. G. A. Keartland sends me the following note from Melbourne relative to this species:—"Whilst the Pallid Cuckoo usually selects open nests in which to lay its eggs, which it does by sitting on the nest in the usual way, the Fantail Cuckoos' eggs and young are more often found in the covered nest of *Acanthiza pusilla*. Whenever this is the case the entrance is somewhat enlarged, and by the time the young Cuckoo is ready to fly, the opening is still further increased in size, and the head of the bird projects. My impression is that the Cuckoo lays its egg on the ground, and carries it in its bill to the nest of the future foster parent, as on two occasions I found broken eggs in the mouths of birds I shot."

Mr. A. F. B. Hull informs me that Mr. O. Clifford took an egg of this species at Windsor, New South Wales, on the 7th October, 1907, from a nest of *Chthonicola sagittata*, which also contained two fresh eggs of the latter bird; and of another found in the nest of *Acanthiza pusilla*, at Freshwater, near Manly, on the 3rd August, 1908, which also contained a fresh egg of the rightful owner of the nest, but who eventually abandoned the latter owing to heavy rain.

From Abbotsford, near Melbourne, Mr. J. Gabriel sends me the following note:—"I found the egg of the Fan-tailed Cuckoo in the nest of the Yellow-breasted Thickhead (*Pachycephala*

gutturalis) at the Werribee Gorge, in October; and another egg in the nest of the White-throated Scrub Wren (*Scricornis frontalis*), on the 27th December, in the Dandenong Ranges, Victoria."

Mr. Tom Carter sends me the following note from Broome Hill, South-western Australia:—"I shot a female Ash-coloured Cuckoo (*Cacomantis flabelliformis*) at Albany, on the 31st January, 1905, and a male, also at Albany, on the 15th May, 1907, while perched on the telegraph wire between that place and Breaksea Lighthouse."

From Queenstown, South-western Tasmania, Mr. Geo. F. Hinsby writes me:—"I have found the eggs of the Fan-tailed Cuckoo in the nests of the following species:—Sombre Bush Tit (*Scricornis humilis*), Brown Tail (*Acanthiza diemenensis*), Great Acanthiza (*Acanthiza Acanthornis magna*), and occasionally in the nest of the Dusky Robin (*Amaurodryas vittata*)."

Mr. Malcolm Harrison sends me the following notes from Tasmania:—"I found a nest of *Scricornis humilis* on the 12th November, 1893, containing an egg of that species and an egg of the Fan-tailed Cuckoo; both were fresh. On the 8th November, 1897, I took an egg of the Fan-tailed Cuckoo in the nest of *Malurus gouldi* (*M. cyaneus*, Ellis, *nec* Gould). On the 16th September, 1899, I found an incubated egg of the Fan-tailed Cuckoo in the nest with an incubated egg of the Reed Lark (*Calamanthus fuliginosus*), and on the 9th October, 1908, an egg of the Fan-tailed Cuckoo in the nest of the Brown Tail (*Acanthiza diemenensis*), but it did not contain an egg of the rightful owner. I also found a Fan-tailed Cuckoo's egg on the 13th November, 1898, in a nest with three eggs of *Acanthornis magna*, all of which were partially incubated."

Mr. S. Robinson also informs me he has in his collection the eggs of this Cuckoo, taken with the following sets:—*Amaurodryas vittata*, *Gerygone fusca*, *Malurus australis*, *Rhipidura albiscapa*, *Sauroprocta melaleuca*, *Ptilotis chrysops*, *P. leucotis*, *Meliornis australasiana*, and *Artamus tenebrosus*."

Mr. George Savidge writes me from Copmanhurst, Clarence River, that he has the eggs of the Fan-tailed Cuckoo taken with sets of *Scricornis citreogularis* and *S. magnirostris*.

From Dr. Lonsdale Holden's notes, made while resident at Circular Head, on the north-west coast of Tasmania, I extract the following:—" *Cacomantis flabelliformis* were numerous on Circular Head Peninsula during September 1886, and often seen or heard two or three together. So far as I have been able to make out by repeated and close observations, they have three different notes or calls; one is a kind of rattle, another a low short mewling whistle repeated frequently, a third a loud rather piercing yet liquid single whistle, which is seldom uttered. On the 24th September I shot a bird in the act of uttering his mewling mournful whistle, which is preceded by a short kind of cluck. It was calling to another, which answered in a different kind of key, and after the first one was shot the other flew about among the trees calling for it with the rattling whistle they utter so frequently. The bird I shot proved to be a male, and its gizzard was full of seeds. At Circular Head I have usually first noted the Fan-tailed Cuckoo early in September, but I have also seen and heard it in May, June and July. At Bellerive, near Hobart, I had a close view of one on the 18th August, 1889, industriously repeating his rattling scale. In the following year I heard one calling on Mount Wellington, near the Huon Road, on the 10th June. On 5th May, 1907, I heard the species calling several times high up on the slopes of Mount Wellington, two thousand feet above the level of the sea. On the 21st July I saw one feeding in our orchard in Bellerive, perching on bare apple trees, and flying now and again on to the ground to pick up a grub or an insect."

The eggs of the Fan-tailed Cuckoo vary from rounded to a compressed or elongate oval in form, the shell being close-grained, smooth, and as a rule slightly lustrous. They are of a dull white-ground colour, which is thickly covered all over with very small dots of pale purplish-brown intermingled with similar but fewer underlying markings of light slaty-grey, which predominate on the thicker end, where they form a more or less well defined zone. One before

me. taken from a nest of *Acanthya pusilla* on the 31st August, 1893, at Belmøre, New South Wales, which contained two eggs of the rightful owner, also an egg of *Lamprocoecyx flagosus* and an egg of *L. bassilis*, is lustreless and has only a zone, consisting of almost invisible markings of very faint purplish-brown around the larger end, with a few dots of the same colour, barely distinguishable without the aid of a lens, scattered over the remainder of the shell. This egg is slightly larger than usual, and measures: 0.9×0.62 inches. An egg taken at Middle Harbour, near Sydney, on the 22nd September, 1901, from a nest of *Malurus lamberti*, which also contained two eggs of the latter species, measures: 0.83×0.6 inches. An egg of the Fan-tailed Cuckoo taken from a nest of *Orizma rubricata*, at Middle Harbour on the 19th October, 1901, which also contained two eggs of the rightful owner, measures: 0.83×0.58 inches. An egg of this Cuckoo taken from a nest of the same species on the 6th October, 1901, from which I had removed a set of three fresh eggs of the Rock Warbler on the 14th of the preceding month, measures: 0.77×0.6 inches. Another egg of the Fan-tailed Cuckoo, taken from a nest of *Sericornis citreogularis*, at Ourimbah, on the 6th December, 1908, before the rightful owner of the nest had begun to lay, measures: 0.83×0.61 inches.

Fledgelings are brown above, with indistinct rufous barrings; upper wing-coverts like the back; quills dull slaty-brown with narrower rufous-buff margins; edge of the shoulder white; tail feathers blackish-brown, mottled and edged with rufous-buff; all the under surface dull white, the feathers with broad transverse slaty-brown cross-bars, the sides of the neck and the chest washed with rufous. Wing 3.2 inches. Young birds retain this plumage for some time after they have left the nest, but the wings are browner, and the rufous-buff wash is lost on the sides of the neck and chest, the bars on the abdomen are almost obsolete, and the under tail-coverts are white; upper tail-coverts dark slaty-grey; the tail feathers are brown, and marked with white, as in the adult. Wing 5 inches. A further advance towards maturity is exhibited in specimens having the head and upper parts mottled with dark slaty-grey feathers, and the under parts brown, mottled on the throat and fore-neck with dull white. Wing 5.3 inches. Not quite adult birds may be distinguished by the pale rufous buff margins to the median and greater wing-coverts, and the paler rufous-buff wash to the secondaries.

Fresh eggs of the Fan-tailed Cuckoo may be found in the neighbourhood of Sydney from August until the end of December. As a rule, however, they are more commonly found in September, October and November, and the later fledgelings may be usually observed about the first week in January. At Eastwood on the 1st January, 1894, I saw the fledgelings in different parts of the bush being fed by their foster parents, *Geobasilus reguloides*.

Cacomantis variolosus.

BRUSH CUCKOO.

Cuculus variolosus, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 300 (1826).

Cuculus insperatus, Gould, Proc. Zool. Soc., 1845, p. 19; *id.*, Bds. Austr., fol. Vol. IV., pl. 87 (1848).

Cacomantis insperatus, Gould, Hand-bk. Bds. Austr., Vol. I., p. 619 (1865).

Cacomantis variolosus, Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 272 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 160 (1900).

ADULT MALE.—*General colour above brown washed with olive, and having a slight bronzy tinge on the back, rump and upper tail-coverts; wings brown, the wing-coverts and inner secondaries like the back; base of the inner webs of the quills, except the outer primaries, white; tail feathers brown, darker towards the ends, which are tipped and their inner webs notched or toothed with white;*

forehead, crown of the head and mantle dull leaden-grey, becoming slightly lighter on the sides of the head and neck; ear-coverts and the throat, fore-neck and breast light leaden-grey, strongly washed with rufous on the apical portion of the feathers, and passing into rufous-buff on the remainder of the under surface and under tail-coverts; under wing-coverts rufous-buff; bill black; legs and feet fleshy-brown, darker in front; eyelid pearl-grey, iris dark brown. Total length in the flesh 9.4 inches, wing 5.2, tail 4.6, bill 0.62, tarsus 0.6.

ADULT FEMALE.—Similar in plumage to the male.

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria.

THE Brush or Square-tailed Cuckoo may easily be distinguished from the preceding species by its smaller size, lighter fore-neck and breast, and by having the lateral tail feathers notched or toothed with white only on their inner webs. It is widely distributed over the Australian continent; the type was described by Messrs. Vigors and Horsfield in the "Transactions of the Linnean Society of London," from the skin of a young bird obtained by Caley in the neighbourhood of Parramatta, New South Wales, and the above description is taken from an adult male procured in the same locality.

In the "Catalogue of Birds in the British Museum," Captain G. E. Shelley includes *Cuculus dumetorum*, Gould, from the north-western coast of Australia, as a synonym of the species, a decision with which probably no one will disagree, for I have specimens now before me obtained by the late Mr. T. H. Bowyer-Bower, near Derby, North-western Australia, and they are indistinguishable in size and colour from others procured near Sydney. Gould apparently erred in separating the north-western bird from his *Cacomantis insperatus*; the figures of the latter, in his folio edition of the "Birds of Australia," he states are of the natural size, and the wing measurement thus represented is 5.1 inches. In his "Handbook of the Birds of Australia," he erroneously gives the wing measurement of *C. insperatus* as 6½ inches, and that of *C. dumetorum* as 5 inches, whereas between the wing measurement of his figure and his *C. dumetorum* there is in reality only a difference of a tenth of an inch, instead of one and a half inch, as represented by Gould. As pointed out by me in "The Ibis," Gould's *Cuculus insperatus* agrees with Latham's original description and figure of *C. flabelliformis*, but it has since been discovered that the latter name was founded only on Watling's paintings, and it would be better to allow the name to stand than to change the nomenclature again. In the "Catalogue of Birds in the British Museum," Captain Shelley, instead of placing Gould's name of *Cuculus insperatus* as a synonym of *Cacomantis variolosus*, as he has done with his *C. dumetorum*, allows it to stand for an exclusively extra Australian species which inhabits New Britain, New Guinea, the Solomon and Aru Islands, and some of the Moluccas. Dr. R. B. Sharpe has also copied this error in his "Hand-list of Birds."† The name cannot, however, be used for a species inhabiting these islands, for it was founded on an Australian specimen procured by Gould himself, in the cedar brushes of the Liverpool Range, New South Wales, on the 20th of October, 1830, and must rank as a synonym of *Cacomantis variolosus*.

There are also specimens in the Australian Museum Collection, procured in the Northern Territory of South Australia, in different parts of Queensland, from Cairns on the north-east to the Coomura River in the south-eastern part of that State. In New South Wales, from various localities in the neighbourhood of Sydney; also from the Clarence, Richmond and Tweed Rivers on the northern coastal districts. I have also examined specimens obtained at Heidelberg and the Dandenong Ranges, Victoria.

The wing measurement of adult males varies from 4.9 to 5.2 inches.

* Ibis, 1906, p. 54.

† H-l. Bds., Vol. II., p. 160 (1900).

The Brush Cuckoo is a permanent resident in the neighbourhood of Sydney, and may be found about Greenwich, Narrabeen, Roseville and Middle Harbour throughout the year. The only time I have noted this bird scarce, or conspicuous by its absence, is in February and March, and generally just about the hottest month of the year, when there is a marked diminution in all species once common in these and other districts. I have frequently taken a walk in the bush at this season, and noted the almost entire absence of birds, where a few months before the place was enlivened with their notes and they were busy with family cares.

In habits the Brush Cuckoo resembles the preceding species, haunts the same situations, and both are often found in the same localities, but it is much more tame and easier of approach.

The call note is a ringing whistling one, which if imitated by the observer, will soon allure the bird if in the near vicinity.

Although a resident species, it is usually the latest of all Cuckoos to lay, one seldom finding its eggs until October, and these may then be looked for until the end of January.

The first to discover the eggs of the Brush Cuckoo, in the neighbourhood of Sydney, were the boys of old Newington College, on the Parramatta River, in 1870, who found it laying in the nests of *Rhipidura albiscapa*. Among the old scholars still resident in the Sydney suburbs may be mentioned Dr. George Hurst, of Homebush, Mr. S. W. Moore of Wahroonga, and Mr. John Waterhouse, head master of the Boys' High School, Sydney; also Mr. Leslie Oakes, a former resident of Parramatta. Dr. Hurst and Mr. Moore continued their researches by finding the eggs of this Cuckoo in the nests of *Malurus australis* and *Ptilotis chrysofs*. At Eastwood on the 21st December, 1893, I also found its egg in the nest of *Rhipidura albiscapa*, and on the 1st January, 1894, in company with Mr. Moore, captured a young Brush Cuckoo at that place which had recently left the nest, and was being fed by a pair of *Rhipidura albiscapa*. At a meeting of the Linnean Society of New South Wales, held on the 28th March, 1894, I read the following note:—"I may here point out that eggs of a Cuckoo, taken near Sydney from nests of *Rhipidura albiscapa*, *Malurus evanescens*, and *Ptilotis chrysofs*, and described at different meetings, when we both referred to them as belonging to *Cacomantis insperatus*, as it was the only other species of Cuckoo found near Sydney whose eggs we were until then unacquainted with, have been verified last season by finding similar eggs in the nests of *Rhipidura albiscapa*, as well as by seeing in the same locality examples of *Cacomantis insperatus*, and by obtaining a young Square-tailed Cuckoo that was being fed by the foster parents, *R. albiscapa*." Confirmatory evidence of the correct identification of this Cuckoo's egg, was obtained the following season by my finding the young Square-tailed Cuckoo in the nest of *Rhipidura albiscapa*, and by my later on finding both the eggs and young of *Cacomantis variolosus* (or *insperatus*, the specific name this species was then known by) in the nests of *Rhipidura rufifrons*. Four nests of *R. albiscapa* found by Mr. C. G. Johnston and myself, at Chatswood and Roseville during the latter end of 1898, all contained an egg each of *Cacomantis variolosus*, in addition to two eggs of the rightful owner in three of them; the other contained a Cuckoo's egg only, which the bird had been sitting on for two days, and had almost to be pushed off the nest. *Rhipidura albiscapa* is undoubtedly the commonest foster parent of *Cacomantis variolosus* around Sydney. Mr. E. H. Lane also found several Brush Cuckoos' eggs, in the nests of this species, on Warabangalong Station, near Dubbo, New South Wales, and over two hundred and eighty miles west of Sydney.

Near Sydney the eggs of the Brush Cuckoo were unusually common on the highlands of Milson's Point railway line at the latter end of 1906 and in January 1907. Mr. A. A. Johnston took no less than seven eggs in as many nests of *Rhipidura albiscapa*. One nest found on the 24th November, 1906, four feet from the ground, off which he had to lift the bird, revealed two eggs of the Brush Cuckoo and one egg of *Rhipidura albiscapa*. The nest of this pair of birds he

* Proc. Linn. Soc. N. S. Wales, 2nd Ser., Vol. IX., p. 40.

took again on the 9th of January, 1907, when it contained two eggs of the White-shafted Fantail and one egg of the Brush Cuckoo. On the 5th January, 1907, he took a nest of *Malurus lamberti*, with two eggs, also an egg of the Brush Cuckoo; this was the first time I became aware of the egg of this Cuckoo being found in the nest of this species. Four fresh eggs were taken from a nest of the same pair of birds on the 16th January, and two eggs of Lambert's Superb Warbler from the third nest of this pair of birds on the 29th January, 1907; also an egg of the Brush Cuckoo. On the 18th November, 1906, Mr. Johnston took a nest of *Myiagra rubecula*, containing two eggs of that species and an egg of the Brush Cuckoo.

Of other foster parents Mr. G. A. Keatland informs me that the egg of the Brush Cuckoo has been found in Victoria in the nests of *Mirafca fascians* and *Falconculus frontatus*; and in Mr. J. Gabriel's collection I saw an egg of this Cuckoo, taken at Bayswater with a set of *Erythrodryas rosca*. Mr. G. Savidge, at Copmanhurst, New South Wales, found the egg in the nest and with the eggs of *Poecilodryas capito*.

From Victoria Mr. G. A. Keatland sends me the following note:—"Although this bird bears a close resemblance to *Cacomantis flabelliformis*, and makes its appearance in Southern Victoria about the same time, I have never seen its egg in covered nests, but have found it with those of the Brown Flycatcher and Scarlet-breasted Robin."

Mr. J. Gabriel, of Abbotsford, Victoria, sends me a note stating that his son, Mr. Charles Gabriel, took the egg of this Cuckoo on the 11th December, 1897, with a set of three eggs of the Rose-breasted Robin, at Bayswater, Victoria, and that it was "fairly abundant during that year, and its eggs were found in all sorts of open nests."

Mr. E. H. Lane, of Orange, New South Wales, kindly sends me the following note:—"The eggs of the Square-tailed Cuckoo (*Cacomantis variolosus*), or *C. insperatus*, the name it was formerly called, were first taken in the neighbourhood of Sydney by the boys of old Newington College, on the Parramatta River, to whom the bird was known as the "Devil-bird Cuckoo" as all the eggs at that time were found in the nests of the White-shafted Fantail, which the boys called the "Devil-bird" for some reason or another. I had three eggs in my collection in 1879, all taken years before at old Newington, one by Mr. Leslie Oakes and two by Mr. W. W. Baird, of Dubbo. Dr. Geo. Hurst and Mr. John Waterhouse also obtained eggs of this Cuckoo while at old Newington."

Mr. John Waterhouse, head master of the Sydney Boys' High School, writes me as follows:—"I have been glancing at my ornithological notes taken years ago, and find that in the bush near old Newington College, on the Parramatta River, I took several nests of the "Devil-bird" (*Rhipidura albiscapa*) in October and early in November, 1870, and in two of them found an egg differing in several respects from the "Devil-bird's" eggs, and these strange eggs we called "Devil-bird Cuckoo eggs." Again on the 22nd November, 1875, I found another of these Cuckoo's eggs in the nest of *Rhipidura albiscapa*. I saw two of these eggs in Dr. G. Hurst's collection, who obtained them about the same time and in the same locality, and both were the eggs of *Cacomantis variolosus*."

Mr. W. Leslie Moore has sent me the following notes:—"On the 4th December, 1891, in company with my father, Mr. S. W. Moore, at Haslem's Creek, Rookwood, we found an egg of the Brush or Square-tailed Cuckoo in the nest of *Ptilotis chrysops*, which also contained an egg of the latter species. At Eastwood five nests of *Rhipidura albiscapa* were taken, each with two eggs of the rightful owner and also an egg of the Brush Cuckoo. Two were taken on the 26th December, 1891, by my father and Dr. G. Hurst. The others were taken either by my father or myself, two in December, 1893, and one on the 12th November, 1898."

The eggs of the Brush, or Square-tailed Cuckoo, vary from a thick short oval to nearly a true oval in form, some specimens being slightly compressed towards the centre, the shell being

close-grained, smooth and lustrous. They are white, and typically have a band around the larger end consisting of wood or faint purplish-brown irregular-shaped spots and small blotches, with intermingled similar underlying markings of dull slaty or violet-grey, with a few scattered spots of the same colours distributed over the remainder of the shell. An egg of the Brush Cuckoo taken by me at Ourimbah on the 23rd November, 1901, from a nest of *Rhipidura rufifrons*, containing an egg also of the latter species, and both slightly incubated, measures 0.67×0.58 inches. Two eggs of the Brush Cuckoo, taken by Mr. A. A. Johnston at Chatswood, on the 24th November, 1906, from a nest of *Rhipidura albiscapa*, and also containing a single egg of the latter species, measures respectively—(A) 0.74×0.56 inches; (B) 0.67×0.58 inches. Another egg of the Brush Cuckoo taken by Mr. A. A. Johnston in the same locality, from a nest of *Malurus lamberti*, which also contained three eggs of the rightful owner, measures 0.67×0.53 inches. An egg of the Brush Cuckoo taken by Mr. F. A. Shelley, at Lindfield, on the 15th November, 1908, from a nest of *Myiagra rubecula*, which also contained three eggs of the rightful owner, measures 0.71×0.57 inches: this egg is barely distinguishable from those of *Myiagra rubecula*. Some specimens from Victoria seem to be slightly larger than typical examples obtained in New South Wales, an egg in Mr. G. A. Kearland's collection measuring 0.85×0.63 inches, but another measures only— 0.69×0.57 inches.

Semi-adult birds resemble the adults in the upper parts, but the head is of a brownish-grey and has pale rufous-buff tips to some of the feathers, and to the margins of the upper wing-coverts; all the under surface is dull white, and having transverse brown cross-bars, which are less distinct on the throat and fore-neck, having a slight rufous-buff wash; lower part of the abdomen, vent, under-tail and under wing-coverts are very pale rufous-buff. Wing 5 inches.

The Brush or Square-tailed Cuckoo's eggs in New South Wales are usually deposited in the nests of other species from the beginning of October until the end of January.

Genus MESOCALIUS, *Cabanis*.

Mesocalius osculans.

BLACK-EARED CUCKOO.

Cuculus palliolatus, Lath. Ind. Orn., Suppl. II., p. xxx. (1801) (deser. nulla).

Chalcites osculans, Gould, Proc. Zool. Soc., 1817, p. 32; *id.*, Bds. Austr., fol. Vol. IV., pl. 88 (1848).

Mesocalius osculans, Gould, Handb. Bds. Austr., Vol. I., p. 621 (1865).

Misocalius palliolatus, Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 279 (1891); North, Horn Sci. Exp. Centr. Austr., Zool., p. 65 (1896).

Mesocalius palliolatus, Sharpe, Hand-l. Bds., Vol. II., p. 160 (1900).

ADULT MALE—*General colour above greyish-brown, washed with bronzy-olive; wings like the buck, the quills being very narrowly edged with whitish brown; upper tail-coverts pale ashy-brown, with whitish tips, but which is more pronounced on their outer webs; tail feathers bronzy-olive-brown, tipped with white, the inner web of the outermost feather on either side having four well pronounced white cross-bars, the inner webs of the penultimate feather similarly but less distinctly marked; forehead and sinciput dark ashy-grey; lores black; ear-coverts and a line extending on to the sides of the neck black, duller in colour on the latter; over the eye and extending above the ear-coverts a broad conspicuous white stripe; upper portion of the chin and cheeks dull whitish, the former washed with rufous-buff; remainder of the under surface pale rufous-buff, passing into dull whitish on the centre of the abdomen; lower sides of the flanks pale brown, with broad dull white margins to most of*

the feathers; under tail-coverts white, with three pale olive-brown cross-bars; under wing-coverts rufous-buff; bill black; legs and feet black, soles of feet greyish. Total length in the flesh 7.5 inches, wing 4.6, tail 3.7, bill 0.6, tarsus 0.7.

ADULT FEMALE.—Similar in plumage to the male, but slightly smaller. Wing 4.4 inches.

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

LATHAM'S descriptions of this species, both in his "Supplement to the Synopsis of Birds," under the name of the "Tippit Cuckoo," and in his "Index Ornithologicus," as *Cuculus palliolatus*, are so absolutely incorrect and utterly misleading, that I have discarded them. As pointed out by Dr. R. B. Sharpe in "The History of the Collections contained in the Natural History Departments of the British Museum," Birds, both names are founded on one of Watling's paintings or drawings, and are there referred to by Dr. Sharpe as *Misocalius palliolatus*, and who remarks:—"This drawing is the type of *Cuculus palliolatus* of Latham." How much Latham's name is entitled to stand as the authority for the specific name of the Cuckoo, may be gathered from part of his original description of it under the name of "Tippet Cuckoo:"—"This is nearly twelve inches long; . . . the upper parts of the body are dull green, the under white; . . . thighs marked with a few rusty spots; tail very short, the outer margins of the feathers marked with white spots; legs dusky bluish-white, dotted with black," which is entirely incorrect in every particular. Latham's descriptions of birds, only taken from drawings, and without access to specimens, should be discarded, for it would be impossible to tell in many instances for what species they were intended, unless he had indicated to which they were applied in his "General Synopsis of Birds."

Gould accurately described and figured the Black-eared Cuckoo in his folio edition of the "Birds of Australia," under the name of *Chalcites osculans*, but in some specimens the black ear-coverts and sides of the neck are not so well defined as there represented. Individual variation exists in this species, a specimen from South Australia being much darker, especially on the rufous-buff under parts, than in examples from New South Wales and Northern Australia.

The Black-eared Cuckoo, although widely distributed over Australia, is the rarest member of the family *Cuculidæ* inhabiting our island continent. I have specimens now before me from all points of the compass, but not in the numbers of any other species of *Cuculidæ*. In the "Catalogue of Birds in the British Museum," Captain G. E. Shelley also includes in its range the Aru, Ki and Moluccan Islands.

This species is undoubtedly a nomad over the greater part of Australia, the late Mr. H. K. Bennett and Dr. A. M. Morgan alone meeting with it in any numbers. Gould obtained a specimen on the Lower Namoi River, New South Wales, on the 24th December, 1839, the late Mr. K. H. Bennett procuring a specimen in July, 1883, at Combie Station, in Western New South Wales. In 1886 both the late Mr. T. H. Bowyer-Bower and Mr. E. J. Cairns obtained specimens near Derby, North-western Australia, and lower down the coast at Point Cloates, Mr. Tom Carter has on two occasions secured examples. In company with Dr. E. P. Ramsay, in August 1887, I shot an adult male while it was feeding on the grassy sward in a brush scrub near Dubbo, New South Wales; it was the first specimen Dr. Ramsay or I had handled in the flesh. A single example was sent me for examination that was obtained by the Horn Scientific Expedition in Central Australia, in 1894. Another specimen was received from Mr. A. E. Hays, of Stony Batter, Uralla, on the 25th September, 1901, and there are undoubted specimens in the collection from Moreton Bay, Queensland, and one from South Australia. Mr. L. Harrison showed me a specimen he had obtained at Manly, near Sydney, and Mr. H. L. White, of Belltrees, Scone, sent me one of its eggs for identification found in the nest of and

with a set of eggs of *Chthonicola sagittata*; again Mr. A. F. B. Hull showed me an egg of the Black-eared Cuckoo taken in the nest of and with an egg of *Chthonicola sagittata*, by Mr. H. Keane, at Flemington, near Sydney, on the 8th November, 1908. Subsequently Mr. Keane showed me another similar set taken in the same locality, and Dr. Ernst Hartert has recorded specimens from the Alligator River, in the Northern Territory of South Australia.

The late Mr. K. H. Bennett made the following notes respecting this species at Mossgiel, in the Central Districts of New South Wales:—" *Mesocalius osculans* may be regarded as only an occasional visitor to this part of the country, appearing at times in considerable numbers, and then disappearing for several years in succession. It is a quiet and unobtrusive bird, and passes a great portion of its time on the ground, over which it hops in a quiet, sedate manner. Usually it is met with either singly or in small companies of five or six individuals. I have never seen its eggs."

Mr. H. L. White, of Belltrees, Scone, New South Wales, has kindly sent me the following note:—" On the 18th September, 1907, while riding along the top of a white box ridge, near the back of the Hunter River, eight miles above Belltrees, my dog put up a bird which I thought to be a Cuckoo, but could not recognise. Searching about in a tussock from which the bird flew, I came across a nest, undoubtedly of *Chthonicola sagittata*, and containing three fresh eggs. Puzzled by the variation in the eggs, and by the presence of the strange bird, I sent the clutch to the Australian Museum, Sydney, for report, the reply being one egg of *Mesocalius palliolatus* and two of *Chthonicola sagittata*. The Cuckoo's egg is very dark chocolate in colour, and measures 0.84 × 0.57 inches. I have since seen here what I took to be the same species of Cuckoo, but have never shot a specimen for identification."

From Melbourne Mr. G. A. Keartland sends me the following notes:—" *Mesocalius palliolatus* is fairly common in Central and North-western Australia, and occurs also in Victoria. Last year a friend sent me one from Dandenong, in the southern part of this State, and a few days later a nest of *Chthonicola sagittata*, containing an egg of the Black-eared Cuckoo and two other eggs belonging to the rightful owner of the nest. At Ilamurta, on the Fisher River, Central Australia, Mr. C. Ernest Cowell found eggs of this species in the nests of *Acanthiza chrysorrhea* and *Pyrrhuloxia brunneus*. Quite recently the Black-eared Cuckoo has made its appearance near Melbourne, and I shot a female during the visit of the Field Naturalists' Club of Victoria to Melton, on the 24th October, 1908. After I had skinned it, and was opening up the body to ascertain the sex, I found it to be full of well developed eggs. One was of full size, and lacked only the limy-coating of a perfect egg; the others varied in size from a fully formed yolk down to a small sized pea. This implies that these birds must lay a number of eggs during the season."

From Blackpool, South Australia, Mr. Edwin Ashby writes me:—" The only specimen of *Mesocalius palliolatus* I have in my collection, was sent me in the flesh by Dr. W. A. Angove, from the Mallee country, near Mannum, South Australia."

From Adelaide, South Australia, Dr. A. M. Morgan sends me the following note:—" I shot a single specimen of *Mesocalius osculans* at Laura, but unfortunately have lost the date; it was the only one seen by me, nor have I ever seen one further south. They were fairly numerous at Mount Gansen from the middle of July to early in August, 1900. Their loud call could be constantly heard, but they were not so easy to get a sight of. I did not discover any eggs."

While resident in North-western Australia, Mr. Tom Carter wrote me as follows:—" Only two examples of *Mesocalius osculans* have come under my notice, and both were shot at Point Cloates on the 19th May, 1898 and 16th April, 1900, after hurricanes, when grass and insect food were plentiful."

The egg of the Black-eared Cuckoo typically is elliptical or a compressed oval, and sometimes nearly a true oval in form, the shell being close-grained, smooth, and lustreless, and is of a uniform rich chocolate-brown colour. An egg taken by Mr. C. Ernest Cowle, at Illamurta, Central Australia, on the 5th March, 1896, from a nest of the Red Throat (*Pyrhoholemus brunneus*), which also contained the eggs of the rightful owner, measures : 0.83×0.59 inches. Another taken by Mr. Cowle on the 12th March, 1902, from a nest of the same species at Illamurta, but containing three eggs of the Red Throat, measures : 0.77×0.57 inches. Undoubtedly the nest of the Red Throat is the commonest receptacle for the Black-eared Cuckoo's egg, and there is not a striking difference in the colour of the eggs, for both are dark, as in *Geobasiliscus chrysorrhœa*; on the other hand the egg of the Black-eared Cuckoo is almost uniform in colour with the eggs of the Streaked Warbler (*Chthonicola sagittata*), in whose nests it has on several occasions been found, and from which it can only be distinguished by its more elongated form and larger size from those of the rightful owner.

Young males resemble the adults on the upper parts, but are slightly darker, the entire head is brown, the tips of the ear-coverts dark brown; all the under surface and under tail-coverts brownish-grey; the cheeks and fore-neck and under tail-coverts are washed with rufous-buff, which is more distinct on the latter. Wing 4.5 inches.

In New South Wales Mr. H. L. White records finding the eggs of the Black-eared Cuckoo in September, and in Victoria Mr. G. A. Keartland found a nearly full-sized egg while dissecting a female he obtained at Melton, Victoria, towards the latter end of October. In Central Australia Mr. C. Ernest Cowle procured most eggs of this species in March, the usual breeding time in that part of this continent if rain sets in, and it is a normal season.

Genus LAMPROCOCYX, Cabanis and Heine.

Lamprococcyx plagosus.

BRONZE CUCKOO.

Cuculus plagosus, Lath., Ind. Orn., Suppl. II., p. xxxi. (1801).

Chrysococcyx lucidus, Gould, Bds. Austr., fol., Vol. IV., pl. 89 (pt.), centre fig. (1848).

Lamprococcyx plagosus, Gould, Hand-bk. Bds. Austr., Vol. I., p. 623 (1865).

Chalcococcyx plagosus, Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 297 (1891); Sharpe, Cat. Bds. Brit. Mus., Vol. II., p. 162 (1900).

ADULT MALE.—*Crown of the head, hind-neck and mantle lustrous coppery-purple, passing into a metallic bronze-green on the wings, back, rump and upper tail-coverts; primaries brown, the outer webs with narrow white-brown edges; tail feathers brown, the central ones strongly washed with metallic bronze-green and crossed with a subterminal and black band, and having a small white spot near the tip of the inner web, the lateral feathers with alternated black and white bands on their inner webs, and the penultimate feather two or three more or less distinct rufous spots; the outer webs brown with half rounded white markings, which are almost lost on their apical portion; sides of the head and neck dull white, mottled into dull bronzy-brown; throat and all the under surface and under tail-coverts white, transversely and evenly barred with metallic coppery-bronze, which is less lustrous on the throat; bill black; legs and feet dark slaty-grey; iris reddish-brown. Total length in the flesh 6.45 inches, wing 4, tail 2.9, bill 0.5, tarsus 0.62.*

ADULT FEMALE.—*The sexes are alike in plumage.*

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia, Tasmania.

IN the "History of the Collections contained in the Natural History Department of the British Museum, Birds," Dr. R. Bowdler Sharpe informs us that the type of *Lamproccyx plagosus*, from which Latham took his description of *Cuculus plagosus* in his "Index Ornithologicus," is a drawing of Watling's in the possession of the Trustees of the British Museum.

The ultra-Australian range of the Bronze Cuckoo, according to Captain G. E. Shelley in the "Catalogue of Birds in the British Museum,"† extends to Southern New Guinea, New Britain, New Ireland, and the Solomon Islands. In the Australian Museum Collection there are specimens from nearly every part of the coastal districts of the continent, but by far they are in excess from Eastern Australia. There is a specimen from Cape York, obtained by the late Mr. J. A. Thorpe; another from Cardwell procured by Mr. K. Broadbent, and from there numerous specimens as far south as Tasmania. There is also an adult male and a young male procured by Mr. George Masters at King George's Sound, Western Australia, in September and December, 1868, respectively. One of the most interesting specimens is the skin of an adult

male presented by Dr. Mackinlay. This bird flew on board when forty miles east of Lord Howe Island, in 1882. It is a remarkable fact that in a series of twenty adult skins now before me, nineteen of them are sexed as males.



BRONZE CUCKOO.

The countless numbers of injurious insects and their larvæ, especially the latter, which the Bronze Cuckoo destroys every year are almost incredible; and the service it renders to the orchardist and viticulturist should secure for this extremely useful bird absolute protection. Fortunately it is distributed over the greater portion of the Australian Continent and Tasmania. In a large number of stomachs of these birds examined, caterpillars formed by far the staple article of diet. Mr. F. Baker, of Granville, near Sydney, informed me that on the morning of the 16th December, 1895, he saw a Bronze Cuckoo pick

off and eat a large number of caterpillars from his grape vines, and that it is the only species he has seen eat the larvæ of the Vine Moth (*Agarista glycine*.) To orchardists it is extremely useful, for it picks and eats caterpillars off fruit trees, more frequently when the fresh young leaves are bursting forth, which renders their foliage more liable to attack than at any other time. Although usually shunning the more frequented haunts of man, it may be met with occasionally in the parks and gardens of Sydney, and sometimes its notes may be heard in the Fig trees in the Museum grounds.

In New South Wales it may be found throughout the year, but is less in evidence during the winter months, as it does not call so frequently, but seeks and obtains its food in a quiet and unobtrusive manner, hopping noiselessly and fluttering from leafy spray to spray in the same way as the different species of *Melithreptus* and *Ptilotis*, and clinging and hanging in every conceivable position. At Dobroyde on the 24th July, 1891, I watched for a quarter of an hour one of these birds quietly feeding in a low gum tree near my house, and on passing the tree an hour later, it was still there feeding in the leafy sprays of the tree. During the whole of the time I was watching it I never heard it utter a sound. The Bronze Cuckoo appears to be extremely local in habits, leading a solitary life as a rule during the winter months, and it is only in the breeding season that a pair or more are seen associated together. At Roseville during September, 1908, in light drizzling rainy weather, a Bronze Cuckoo did not venture out of the

* p. 122 (1906). † Cat. Bds. Brit. Mus., Vol. XIX., p. 298 (1891).

garden for four days, and passed all its time between three gum saplings not more than ten yards apart. Day and night it uttered its somewhat mournful note. Another roosted in a thickly foliated wattle for a month or more, its note being frequently heard at all hours of the night. In midwinter, at Randwick, I have also seen this species feeding on the ground in low sandy scrub-covered heath lands.

A favourite position for the Bronze Cuckoo to utter its note is near the end of a dead branch. In fact to hear the call of this or any other species of Cuckoo frequenting the neighbourhood of Sydney during the spring and summer months, one invariably looks for the owner of it near the end of a dead lateral, or upright branch of a tree. The note of the present species is a somewhat plaintive one, resembling the sounds "pee—e, pee—e, pee—e," uttered from about six to sixteen times in succession, and usually terminating with a "pi—eu."

Although the note of *Lamprococcyx flagosus* is widely different, in a state of nature this species resembles *L. basalis*, unless one is quite close to the bird. The former, however, may be readily distinguished by its more brilliantly coloured upper parts, and by the more regular and unbroken transverse barrings of the throat and breast, and by having only a few rufous spots on the tail feathers.

Mr. G. A. Kearthland writes me as follows from Melbourne:—" *Lamprococcyx flagosus* is generally the first of the *Cuculidæ* to visit Southern Victoria. It usually selects the nests of the *Acanthiza* in which to lay its eggs. There is one particular bush in the corner of a paddock at Melton, in which I have found a nest of *Acanthiza chrysorrhoa* every time I have visited the district during the month of October for the last twenty years, and on each visit it contained an egg of this species. I have several times disturbed these birds from the ground, and on examining the spot discovered an olive coloured egg of this Cuckoo, quite warm and apparently just laid."

From South Australia Mr. Edwin Ashby sends me the following note:—"The Bronze Cuckoo appears to be numerous in the Adelaide Hills, and I have seen several together at a time in some of the deep gullies in the higher stringy-bark ranges. The eggs of this species are common at Blackmore in the nest of the Superb Warbler. On the 21st August, 1906, I found a nest of *Meliornis nove-hollandia* containing two eggs of that species, and five days later one of the Honey-eater's eggs had been turned out, and in its place was an egg of the Bronze Cuckoo."

From Freshwater, near Manly, Mr. A. F. B. Hull sends me among other notes relative to the eggs of the Bronze Cuckoo, the following:—"At Blacktown on the 14th October, 1906, I found a nest of *Chthonicola sagittata* overturned, and two eggs of that species and one of the Bronze Cuckoo (*C. flagosus*), all fresh and undamaged, lying on the ground beside the nest. The upper side of the Cuckoo's egg was partially bleached by exposure to sun and rain. A nest of *Acanthiza lineata*, built in the top of a white gum sapling at Freshwater, on the 23rd August, 1908, contained two eggs of that species and one of the Bronze Cuckoo. They were taken on the 30th August, without additions and the incubation advanced."

Mr. J. Gabriel, of Abbotsford, near Melbourne, informs me that in one instance at Mooroolbark, Victoria, he found two eggs of the Bronze Cuckoo (*Lamprococcyx flagosus*) in the nest of, and with two eggs of the Superb Warbler (*Malurus australis*, = *M. cyaneus*, Gould, *nee* Ellis.)

Mr. S. Robinson tells me he has in his collection the eggs of *Lamprococcyx flagosus* taken with the following sets:—*Petroica goodenovii*, *Pacilodryas cerviniiventris*, *Rhipidura albiscapa*, *Chthonicola sagittata*, *Acanthorhynchus tenuirostris*, and *Ptilotis chrysopt.*

Mr. Malcolm Harrison, of Glenorchy, Tasmania, several times found the eggs of *Lamprococcyx flagosus* in the nests of *Acanthiza dickinsoni*, and his experience is that the Brown Tail is

the more common host, but that Mr. A. L. Butler, who has taken many more eggs of the Bronze Cuckoo, finds the Yellow-tail (*Geobasilens chrysorrhous*) the commoner.

From Dr. Lonsdale Holden's notes, made while in Tasmania, I have extracted the following:--
 "A specimen of *Lamprococcyx flagosus* was obtained on Perkins Island on the 7th November, 1888, and on the 11th November I saw one on the northernmost part of Circular Head Peninsula. On the 30th October, 1908, I found the oval-shaped greenish-drab egg of *Lamprococcyx flagosus* in a nest of the Brown-tail (*Acanthiza diemenensis*), with three fresh eggs of the owner's laying. The nest was in a tea-tree bush hanging over the bed of the Newtown Creek, five feet or more from the ground, and was more visible than any nest of this species I have seen before. On the 25th October, 1903, I shot a Bronze Cuckoo in a tree at the end of Bellerive Beach. The call of this bird is a single note, whistled at regular intervals, a dozen or more times in succession. It recalls the first sound of the double call of the Dusky Robin (*Amunodryas vittata*) but is not so loud."

The egg of the Bronze Cuckoo is a compressed ellipse or is elongate-oval in form, the shell being close-grained, smooth, and as a rule lustreless. Typically they are of a shade of olive-brown, some being much lighter than others approaching a very pale greenish-olive; others are richer in colour, and of a distinct bronzy-brown hue. The colouring may be removed by the application of moisture or rubbing the shell with a damp cloth, disclosing a pale sky-blue to a skim-milk hue underneath. Four eggs taken respectively from the nests of the Sun Bird (*Cinnyris frenata*), the White-throated Bush Warbler (*Gerygone albigularis*), the Buff-rumped Thornbill (*Geobasilens reguloides*), and the Scrub Tit (*Smicromis brevirostris*) measure as follows:—Length (A) 0.75 × 0.5 inches; (B) 0.72 × 0.52 inches; (C) 0.75 × 0.53 inches; (D) 0.74 × 0.53 inches.

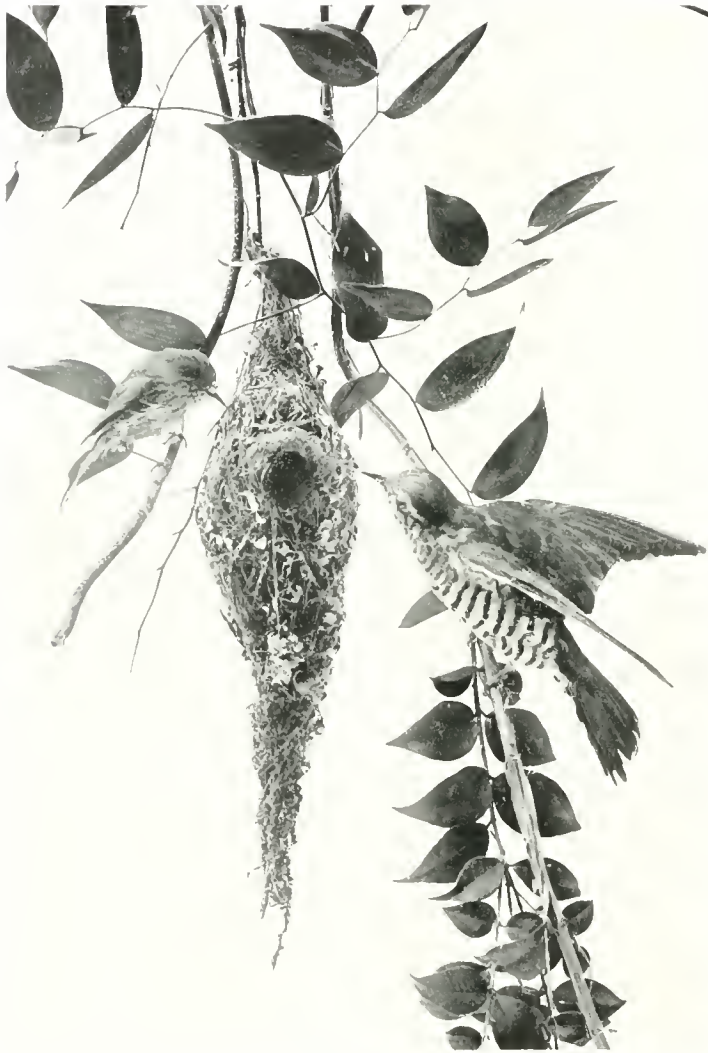
As a rule the egg of the Bronze Cuckoo is deposited in a dome-shaped nest, but not infrequently in an open cup-shaped structure. The task of hatching the egg of this species in the neighbourhood of Sydney most frequently devolves upon *Geobasilens chrysorrhous* and *Gerygone albigularis*. I first found the egg of this Cuckoo at Toorak, Victoria, in the nest and with three eggs of *Aegintha temporalis*, and have also at various times taken it, in addition to those mentioned, from the nests of the following species, *Gerygone fusca*, *Smicromis brevirostris*, *Petrarca leggii*, *Malurus australis* * (= *M. cyanus*, Gould, nec Ellis), *Acanthiza pusilla*, *A. nana*, *A. lineata*, *Geobasilens reguloides*, *Ephthianura albifrons*, and have also taken two eggs of *L. flagosus* from a nest of *Geobasilens chrysorrhous*. I have also received an egg of the Bronze Cuckoo, taken by Mr. J. A. Boyd at the Herbert River, Queensland, in the nest and with an egg of the Sun Bird, and from Cairns and Cape York in the nest and with the eggs of the Masked Bush Warbler (*Gerygone personata*).

Young birds are brown above, with a slight bronze gloss on the wings, back, rump, and upper tail-coverts; all the under surface dull ashy-white, the fore-neck crossed with a pale brown band, and with indications of dull brown cross-bars on the flanks. Wing 3.7 inches.

How the egg of the Cuckoo is deposited in the nests of some of the smaller species of birds, who build dome-shaped structures, the entrance to which in some instances is further protected by a spout-like tunnel or narrow hood leading to it, is a mystery to me. I know that more or less convincing evidence has been given to show that the egg is deposited by the Cuckoo with its bill, but even so, how is it possible for a bird like the Bronze Cuckoo to get even its head into the spout-like entrance of a nest of *Gerygone fusca*, and which, moreover, is at an acute angle with the domed portion of the nest. I have referred to this previously in Volume I., p. 197, where the nest of this species is figured.

* North, Ibis, 1904, p. 672.

The nest of the Brown Bush Warbler (*Gerygone fusca*) here figured, I found at Ourimbah in November, when it was just ready for eggs, built on a thin drooping twig of a Lilly-pilly, about eight feet from the ground, which runs the whole length of the structure. The entrance, which is only slightly hooded, not spouted, is scarcely large enough to admit its diminutive owner, which may be seen on the left, while on the right is the Bronze Cuckoo, whose eggs I have frequently found in the nests of this species, and so far as I have observed, without the entrance being enlarged.



NEST OF BROWN BUSH WARBLER AND BRONZE CUCKOO.

When the Cuckoo egg is hatched, the intruder is generally found to be the sole occupant of the nest, even while still a bare, callow and apparently helpless creature, with eyes as yet unopened, and only here and there a small tuft of fine filamentous down. From this time onwards, and a while after it has left the nest, the diminutive foster-parents appear to strive in vain to supply it with sufficient food, and resting or flying after them it nearly always loudly clamours to be fed.

Of the Shining Cuckoo (*Lamprococcyx lucidus*) there are three skins in the Australian Museum Collection, one procured by the late Mr. J. A. Thorpe, at Cape York in 1867, and the second and third specimens, both adult females, were respectively received in the flesh by the Trustees of the Australian Museum on the 13th April, 1905, one obtained by Mr. H. O. Jackson at Mosman, and the other procured during the same month of 1908 by Mr. Hugh Pollock (Trustee) at Darling Point; both of these localities are harbour-side suburbs near Sydney. Dr. E. P. Ramsay does not include this species in his "Tabular List of Australian Birds." These specimens are similar in colour and markings to an example in the collection received from the

It was at a meeting of the Linnean Society of New South Wales, held on the 25th October, 1893, that I first drew attention to the protective habit of some Australian birds, who cover the egg of the Cuckoo, when deposited in their nests, with a thick layer of lining material sufficiently thick to prevent incubation.

* Abstr. Proc. Linn. Soc. N. S. Wales, p. iv., 27th Oct., 1893.

late Professor Hutton, and obtained near Christchurch, New Zealand. There is only a slight and almost imperceptible rufous wash on the penultimate tail-feathers of all three specimens. It is worthy of note that both the Mosman and Darling Point specimens are adult females. The eggs of *Lamprocoocyx lucidus* received from New Zealand are an olivaceous-brown, and cannot be distinguished from those of its close ally *L. flagosus*.

Dr. A. M. Morgan sends me the following note from South Australia:—"Twenty-five years ago *Lamprocoocyx flagosus* was very common about the Adelaide Hills, but is now I think much rarer. I judge by the number of eggs one finds, as I am unable to separate this bird from *L. basalis* without handling them. It was no unusual thing at that time to find two or three eggs in an afternoon, but now they are quite rare. The host here was invariably *Acanthiza chrysorrhous*."

Lamprocoocyx basalis.

RUFOUS-TAILED BRONZE CUCKOO.

Cuculus basalis, Horsf., Trans. Linn. Soc., Vol. XIII., p. 179 (1821).

Chrysocoocyx basalis, Gould, Bds. Austr., fol. Vol. IV., pl. 89 (pt.), upper and lower figs.

Lamprocoocyx basalis, Gould, Hand-bk. Bds. Austr., Vol. I., p. 626 (1865).

Chalcoocyx basalis, Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 294 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 162 (1900).

ADULT MALE.—*General colour above brown, the feathers of the head having a very slight dull purplish tinge, those of the back, rump and upper tail-coverts, wings and tail strongly glossed with bronzy-metallic green; all the upper wing-coverts and quills narrowly edged with whitish-brown, and having the inner webs of the latter about the centre rufous near the shaft, paling into whitish-brown on the extreme edge; over the eye and extending on to the sides of the nape, a more or less well defined whitish streak; ear-coverts brown; chin, throat and fore-neck whitish, the latter irregularly and transversely barred with brown, and the interspaces having a slight brownish tinge; remainder of the under surface white barred with brown on the sides of the breast; under tail-coverts white and having three or more diamond or heart-shaped bronzy-brown spots down the centre; bill black; legs and feet unalloyed grey; iris orange. Total length in the flesh 6.75 inches, wing 4, tail 2.9, bill 0.7, tarsus 0.72.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

THE Narrow-billed or Rufous-tailed Bronze Cuckoo is, if anything, even more freely dispersed over the Australian continent than the preceding species, and evinces a decided preference for the coastal districts, whereas *Lamprocoocyx basalis* is found equally plentiful in the inland districts and in Central Australia as it is elsewhere. It likewise occurs in Tasmania, and according to Captain G. E. Shelley is also found in the Aru Islands, Timor, Flores, Lombok, Java and Malacca. It is needless to here recapitulate the many different parts of the continent in which it has been obtained. To Eastern Australians it is well known, and is a permanent resident throughout the year in the neighbourhood of Sydney, but as has been previously mentioned of other species, it is more in evidence during the spring and summer months. The late Mr. T. H. Bowyer-Bower obtained specimens at Derby, North-western Australia, in 1886. Mr. Tom Carter sends me a note of its occurrence at Point Cloates. In 1868 Mr. George Masters obtained adults and young at Mongup, Salt River, Western Australia, and again in the same year at Port Lincoln, South Australia, and Mr. G. A. Keartland procured specimens at Reedy Hole, Central Australia, while a member of the Horn Scientific Expedition.

The extreme northern portion of the continent appears to be the only part where it does not occur, or at least as plentiful, although there is an adult female in the Australian Museum collection obtained at Cape York in 1868.

In the neighbourhood of Sydney it is resident throughout the year, but like *Lamprococcyx flagosus* it makes itself more conspicuous during the spring and summer months, and in habits and in the manner of obtaining its food it is precisely similar to that species. Its note is, however, entirely different, consisting of a plaintive, long drawn out double call resembling the sounds of "whe—o, whe—o, whe—o, whe—o." On one occasion I had an opportunity of observing one of these birds, while calling on the ground, being well hidden from it by a bush. With head well thrown back, and widely distended mouth, it commenced to utter its plaintive notes, and which to my mind more resembled the mewling of a cat than anything else. A Rosehill Parrakeet (*Platycercus eximius*) I had in confinement could imitate the call notes of *Lamprococcyx basalis* to perfection. The plaintive call-note of this species is most monotonous when heard in the still hours of the night. At Roseville one of these birds took up its abode in a thickly-foliaged wattle tree opposite my house, and from the 23rd July, 1901, to the 23rd September I frequently noted it calling throughout the night. In Ashfield I once heard one of these Cuckoos calling from the top of a dead sapling, and observed that between each note it slightly expanded and gave a tremulous movement to the wings. In addition to its different call this species, if one is near enough to it, may be easily distinguished from *L. flagosus* by the brown crown of the head, greater extent of rufous on the tail feathers, and especially by the broken bars on the centre of the lower breast and the white abdomen.

I first found the egg of this Cuckoo in the nest of *Meliornis nova-hollandiæ* in the Botanic Gardens, Melbourne, which also contained three eggs of the rightful owner, and have also at various times taken its egg from the nests of the following species:—*Malurus australis*, *M. lamberti*, *Gerygone albigularis*, *G. fusca*, *Smicromis brevirostris*, *Petraca leggii*, *Acanthiza pusilla*, *A. nana*, *A. lineata*, *Geobasiliscus chrysorrhous*, *G. reguloides*, *Ephthianura albifrons* and *Egitha temporalis*. I have also received the egg of this Cuckoo taken with sets of eggs of the following species:—*Malurus leucopterus*, *M. melanoccephalus*, *M. callainus*, *M. assimilis*.

Although the eggs of any of our Australian Cuckoos may be deposited before the nest of the foster-parent is finished, and covered up with a layer of nesting material, I have on not a few occasions taken the eggs of Cuckoos from nests in which young ones had been reared. I found an egg of *Lamprococcyx basalis* in the nest of the Buff-rumped Thornbill (figured in Vol. I., page 287), a fortnight after the two young birds had left it, and undoubtedly the task of incubating the egg of this Cuckoo devolves most frequently on the different species of the genus *Malurus*. Two eggs of *Lamprococcyx basalis* are not uncommonly found, although one may be more or less covered with lining material. At a meeting of the Linnean Society of New South Wales, held on the 27th September, 1893, I exhibited a set of two eggs of *Acanthiza pusilla*, and also took from the same nest an egg each of the following species of Cuckoo:—*Lamprococcyx flagosus*, *L. basalis* and *Cacomantis flabelliformis*.

Mr. John Waterhouse, head master of the Boys' High School, Sydney, informed me that at Old Newington, on the Parramatta River, he also found the eggs of the same three species of Cuckoo in the nest of, and together with an egg of *Malurus australis*, in December 1875.

The egg is elliptical, elongated, or compressed-oval in form, the shell being close-grained, smooth and lustreless, and of a pinkish-white ground colour, minutely freckled, dotted or spotted uniformly all over with pinkish or brownish-red; in some specimens these markings are confluent, and form small patches of colour on the shell. Four eggs taken respectively from the nests of the following species, Double-bar Finch (*Stectoptera bichenovii*), Lambert's Superb Warbler (*Malurus*

lamberti), White-fronted Wren (*Ephthianura albifrons*), and Flame-breasted Robin (*Petræca phœnicea*), measure as follows:—Length (A) 0·72 × 0·5 inches; (B) 0·7 × 0·5 inches; (C) 0·69 × 0·48 inches; (D) 0·71 × 0·5 inches.

When resident at Mossgiel, New South Wales, the late Mr. K. H. Bennett wrote me as follows:—"The eggs of *Lamprococcyx basalis* in this district are invariably deposited in the nests of *Malurus leucopterus* and *Petræca goodenovii*. On two occasions I witnessed the ejecting of the other occupants of the nest from those of the latter species by the young Cuckoo. After wriggling about some time, the Cuckoo being the larger and stronger bird contrives to get one of the others on its back, and then with a sudden elevation it precipitates the unfortunate fledgeling over the edge of the nest. By way of experiment I once replaced one of the young Red-capped Robins in the nest, but in less than half an hour the Cuckoo was again the sole occupant. I then left it in undisturbed possession, first despatching the unfortunate young Robins, as they would speedily fall a prey to the legions of ants beneath the nest."

Writing under date 27th November, 1906, the late Mr. J. D. Cox of Cullenbone, Mudgee, New South Wales, said:—"I have observed a fact in bird life that may interest you. There is a nest of *Stagonopleura guttata* about eighteen feet from my easy chair on the verandah. I saw a Bronze Cuckoo peering about, and it presently crawled into the nest, but after a few seconds backed out. A couple of days later I saw her go into the same nest, but was quickly hustled out by the Finches. A few days later she made another entry to the nest, and stayed longer, and then came out head first with an egg in her bill, and it was a light coloured egg. This puzzled me, so I went to the nest and put my hand in, when to my wonder the two old Finches were at home sitting on six eggs. I cannot say whether the Finches were in the nest at the time of the Cuckoo's first visit, but when they were at home, on the occasion of her second visit, they savagely drove the intruder out, and when on the third visit they were also at home, they apparently took no notice. The egg the Cuckoo carried out of the nest looked like a Finch's egg, but I could not be certain, as *Lamprococcyx basalis* also lays a light coloured egg."

Mr. G. A. Keartland writes me as follows:—"In every part of Australia I have visited I have seen *Lamprococcyx basalis*, and have either collected or received its eggs from friends nearly all over the continent. The different species of *Malurus*, *Acanthiza* and *Petræca* are most frequently chosen as foster parents for their young."

From Broken Hill, South-western New South Wales, Dr. W. Macgillivray writes me:—"A Bronze Cuckoo (*Chalcococcyx*, sp.?) was noted in June, and often seen during the spring months. Mr. C. Gayer found an egg of *C. basalis* in the nest of *Ephthianura tricolor*, together with the eggs of the latter bird, on his journey from Broken Hill to Wilcannia."

Mr. E. H. Lane, of Orange, New South Wales, informs me that he has, among others in his collection, the eggs of *Lamprococcyx basalis*, taken with sets of the following species:—*Acanthiza lineata*, *Ephthianura albifrons* and *Petræca goodenovii*.

Mr. Tom Carter sent me the following:—"The Narrow-billed Bronze Cuckoo (*Chalcococcyx basalis*) is fairly common about Point Cloates, in North-western Australia, in winter, but is occasionally seen after summer rains. An egg of this species was found in the nest of *Ephthianura tricolor* on 4th March, 1898, and another on 1st June, 1887, in the nest of *Calamanthus campestris*."

From Freshwater, near Manly, Mr. A. F. B. Hull sends me, among other notes relative to the nests of various species in which the eggs of *Lamprococcyx basalis* were found either by himself or in his company, the following:—"A nest of *Malurus lamberti* was found building on the 29th December, 1905, behind the tram shed at the terminus, Manly. On the 6th January, 1906, I saw *Chalcococcyx basalis* near the nest, and approached within an arm's length of her, but

she was not carrying an egg, although the projecting eaves of the nest appeared to be broken on the left side. The nest contained four fresh eggs of *Malurus lamberti*. On examining it at home I found a fresh egg of *C. basalis* embedded in the lining, and completely covered by feathers. In another nest of *M. lamberti*, Mr. L. Harrison found a young *C. basalis*, and while he was examining it my son found a fresh egg of this Cuckoo on the ground beneath the nest. A nest of *Acrocephalus australis*, taken for me at Manly Lagoon by Mr. Kirkwood, on the 16th November, 1907, contained two eggs of this species and one egg of *Chalcococcyx basalis*, in all of which incubation was nearly completed."

Mr. J. Gabriel informs me that the egg of this Cuckoo was found in the Wimmera District, Victoria, in the nest and with the eggs of *Malurus melanotus*.

Mr. S. Robinson informs me that among many others in his collection he has an egg of *Lamprococcyx basalis*, taken with each set of the following species:—*Gerygone culicivora*, *Chthonicola sagittata*, *Acanthiza apicalis*, *A. uropygialis*, *Scricornis citreogularis*, *S. magnirostris*, *Neositta chryoptera*, *Ptilotis chrysofs*, *Meliornis scircea*, *Stictoptera bichenovii*, and *Ægitha temporalis*.

Mr. Thos. P. Austin, of Cobborah Station, Cobbara, New South Wales, tells me he has taken the egg of this Cuckoo at Barwon Park Station, Winchelsea, Victoria, in the nest of *Geobasilens chrysorrhous*.

From Glenorchy, Tasmania, Mr. Malcolm Harrison writes:—"I have many times found the eggs of the Narrow-billed Bronze Cuckoo (*Lamprococcyx basalis*) in the nests of *Malurus gouldi* (= *M. cyaneus*, Ellis, *nee* Gould) and *Geobasilens chrysorrhous*, but the former is by far the commoner host. I have never myself taken more than one egg of any of the Cuckoos from any one nest, but Mr. A. L. Butler took two eggs of *Lamprococcyx basalis* from a nest of *Malurus gouldi*, together with the eggs of the latter species."

From Bimbi, Duaringa, Queensland, Mr. H. G. Barnard has sent me the following note:—"I have taken the eggs of the Narrow-billed Bronze Cuckoo from the nests of the following species:—*Smicronis brevirostris*, *Gerygone albigularis*, *Malurus melanocephalus* and *Stictoptera bichenovii*. From the latter I took three eggs in one season, but in no instance have I seen the Finches feeding the young Cuckoos."

Mr. E. L. Ramsay, at Wilgaroon in Western New South Wales, found an egg of the Narrow-billed Bronze Cuckoo in the nest of *Tamnopygia castanotis*, which also contained three eggs of the latter species.

From Queenstown, South-western Tasmania, Mr. Geo. F. Hinsby reports:—" *Lamprococcyx basalis* saddles almost exclusively *Malurus longicaudus* (= *M. cyaneus*, Ellis, *nee* Gould) with the task of incubating its egg and rearing its young. Only on one occasion have I found it in the nest of another species, that of the Brown Tail (*Acanthiza diemenensis*.)"

From Adelaide, South Australia, Dr. A. M. Morgan writes me as follows:—" *Lamprococcyx basalis* is a common summer visitor. I have met with it in all parts of South Australia which I have visited. At Laura it was a bird of passage only; I never met with an egg there, nor for that matter with the egg of any species of Cuckoo. About Adelaide I have taken many of their eggs, the favourite hosts being *Ephthianura albifrons* and *Malurus cyaneus*, Gould. Near Geelong, where I took many of their eggs, *Ephthianura albifrons* was almost invariably the host. Captain S. A. White showed me a clutch of three eggs of *Scisura inquieta*, together with an egg of this bird, taken in the Murray Scrub."

Fledgelings are brown above with a bronzy-green gloss on the back, wings and tail, the latter tinged with rufous at the base of the lateral feathers; ear-coverts brown, throat and fore-neck fulvous-grey; remainder of the under surface dull white, tinged with fulvous on the sides

of the breast. Wing 2·4 inches. Immature birds are somewhat similar, but are larger, have the rufous on the tail feathers more pronounced, and have a few widely separated brown bars on the throat and sides of the breast. Wing 3·7 inches.

In the neighbourhood of Sydney I have taken fresh eggs from the middle of July until the end of January, but Mr. F. A. Shelley found one at Roseville, in a nest containing three eggs of the rightful owner (*Malurus australis*) as late as the 20th February, 1908.

Two nestlings of *Lamprococcyx basalis* were taken by me on the morning of the 13th November, 1902, at Roseville, having had them under observation from about the time they were first hatched, both being naked, helpless, callow young with eyes unopened, but at that early stage of their existence the sole occupants of the nests of *Malurus lamberti* and *Geobasilus reguloides*. The entrance to the aperture of the nest of the latter species, in the thick trunk of a lofty Eucalyptus, and almost on the ground, was so small that it was with difficulty I could draw the young squab out of it. The other was taken from a nest of *Malurus lamberti*, built in a very narrow grass-grown drain. Both were about twenty days old, and as usual the young Cuckoos, judging by their ceaseless cries, were apparently suffering the pangs of hunger.

Lamprococcyx malayanus.

LITTLE BRONZE CUCKOO.

Cuculus malayanus, Ratll., Trans. Linn. Soc., Vol. XIII., p. 286. (1822).

Lamprococcyx minutillus, Gould, Hand-bk. Bds. Austr., Vol. I., p. 625 (1865).

Chrysococcyx minutillus, Gould, Bds. Austr., fol. Vol., Suppl., pl. 56 (1869).

Chalcococcyx malayanus, Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 298 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 162 (1900).

Lamprococcyx malayanus, North, Proc. Linn. Soc. N. S. Wales (2nd ser.), Vol. IX., p. 41 (1894).

ADULT MALE.—*General colour above, including the wings and tail, metallic bronze-green, but of a more pronounced bronzy hue, and a much greater extent of rufous on the tail-feathers than LAMPROCOCYX LUCIDUS which it resembles in colour, but not in size; centre of the inner webs of the primaries pale rufous, whitish near the edge; forehead and feathers behind the eye mottled with white; cheeks white, with blackish-brown cross bars; ear-coverts and throat and all the under surface and under tail-coverts white, with many bronzy-green cross-bars; bill black; legs and feet greyish-olive; iris reddish-brown; orbital ring bright vermilion. Total length in the flesh 6·25 inches, wing 3·6, tail 2·7, bill 0·58, tarsus 0·6.*

ADULT FEMALE—*Similar in plumage to the male.*

Distribution—Northern Territory of South Australia, Queensland.

THE range of the Little Bronze Cuckoo in Australia, as represented by specimens in the Australian Museum Collection, extends from Port Essington in the Northern Territory of South Australia to Port Denison on the eastern coast of Queensland, a specimen being obtained in that far southern locality by the late Mr. J. Rainbird on the 12th September, 1863. Mr. Kendal Broadbent procured specimens at Cardwell and Cape York. I have also received a spirit specimen in the flesh from Mr. J. A. Boyd, when resident at Ripple Creek, Herbert River, and who informed me that it was the common species in the district.

In the "Catalogue of Birds in the British Museum," Captain G. E. Shelley only records one specimen from the Australian continent, and that is the type of *Lamprococcyx minutillus* described by Gould from Port Essington. Of its extra Australian range Captain Shelley mentions the Malayan Peninsula, Java, Philippine Islands, Borneo, Flores, New Guinea and the Solomon

* Cat. Bds. Brit. Mus., Vol. XIX., p. 299 (1891).

Islands. Captain Shelley includes Gould's types of *Lamprococcyx russatus* from Cape York, under Gray's name of *L. pacilurus*, but the only adult specimen in the Australian Museum collection from that locality has the forehead and feathers over and behind the eye with distinctly whitish mottlings, and is a typical *L. malayanus*. On what grounds Dr. E. P. Ramsay has given *L. pacilurus*, in his "Tabular List of Australian Birds," so wide a range over the northern and north-eastern portion of the Australian continent, I know not. There is not a single specimen of it in the Australian Museum from any part of Australia, nor have I seen one in any collection, but there are three specimens received from the late Professor F. W. Hutton, of Christchurch, New Zealand, and sent to him by Dr. H. O. Forbes, who obtained them from New Guinea. Moreover, *Lamprococcyx russatus*, which Dr. Ramsay records from Cape York to Port Denison, is, I am sure, only the young bird of *L. malayanus*, which is easily discernible by the rufous margins to the outer webs of the quills and upper wing-coverts, the rufous wash on the sides of the neck, and the bronzy-green bars being fewer and wider apart on the under surface. Both specimens under this name in the Reference Collection are from Rockingham Bay, where *Lamprococcyx malayanus* is the common species; Dr. Ramsay, too, must have had some misgivings about these specimens, for he has labelled both *Chalcites russatus*.

Gould's figure of this species, in his "Supplement to the Birds of Australia," under the name of *Chrysococcyx minutillus*, is a fairly faithful representation of this Cuckoo, but the head is of a slightly more pronounced bronzy shade, and being copied from a dried skin lacks the bright vermilion orbital ring which is so marked a character in this species.

I first received the eggs of this Cuckoo, or rather which I attributed to this species at the time, from Mr. J. A. Boyd of the Herbert River, and where subsequently I found that both adults and young of *L. malayanus* are not uncommon. All were taken from the nests of the "Flood Bird," or Large-billed Bush Warbler (*Gerygone magnirostris*). These eggs are elliptical or elongate oval in form, the shell being close-grained, smooth and lustrous. They are of a rich deep olivaceous-bronze, some approaching almost a chocolate-bronze in hue, and with a few small dots on one end. Five specimens measure as follows:—(A) 0.78 × 0.53 inches; (B) 0.8 × 0.53 inches; (C) 0.83 × 0.55 inches; (D) 0.78 × 0.53 inches; (E) 0.82 × 0.54 inches. The eggs of this species are easily distinguished from those of *Lamprococcyx plagosus* by their distinctly darker colour and glossy surface.

Mr. Boyd has taken the eggs of the Little Bronze Cuckoo from September until the end of February, chiefly from nests of *Gerygone magnirostris* overhanging creeks, but on one occasion from one built in an orange tree in his garden.

Genus EUDYNAMIS, Vigors and Horsfield.

Eudynamis cyanocephala.

FLINDER'S CUCKOO.

Cuculus cyanocephalus, Lath. Ind. Orn., Suppl. II., p. xxx. (1801).

Eudynamis flindersii, Gould, Bds. Austr., fol. Vol. IV., pl. 91 (1848).

Eudynamis flindersi, Gould, Handb. Bds. Austr., Vol. I., p. 632 (1865).

Eudynamis cyanocephala, Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 321 (1891); Sharpe, Handl. Bds., Vol. II., p. 165 (1900).

ADULT MALE—General colour above, including the head, wings and tail glossy greenish-blue-black, some of the scapulars and feathers on the centre of the back purplish towards their tips: inner

webs of the quills black : the under surface similar, but far less glossy and duller in colour ; bill bluish-black : legs and feet slaty-grey ; iris red. Total length in the flesh 16·5 inches, wing 8·3, tail 8·3, bill 0·95, tarsus 1·3.

ADULT FEMALE.—General colour above, including the wings, dull bronzy-brown, thickly spotted with white, except on the quills and upper tail-coverts, which are crossed with more or less perfect bars of white ; tail-feathers dark bronzy-brown, with numerous undulating white cross-bars ; head and hind neck glossy greenish-black ; chin and sides of throat dull black, the latter separated from the feathers on the sides of the head and throat by a broad buffy-white streak ; centre of throat, sides of neck and the fore-neck dull white, the former mottled with buffy-white, and the latter washed with ochreous-buff, and having transverse black bars across all the feathers ; the remainder of the under surface dull white, and similarly crossed with blackish bars. Total length 16·5 inches, wing 8, tail 7·7, bill 1, tarsus 1·35.

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales.

THIS is another instance of Latham describing a bird without ever seeing a specimen, but characterising it from a drawing of Watling's, now in the British Museum, and as the late Dr. R. B. Sharpe remarks :—"This drawing is the type of the species, and is a very good representation of the Australian Koel." Latham was able to give a very fair description of the adult female, under the name of the "Blue-headed Cuckoo," in the Supplement to his "General Synopsis of Birds," but he altogether errs as to its size, which he states is about nine inches in length, instead of sixteen inches and a half.

Flinder's Cuckoo, or Australian Koel, is freely distributed over North-western Australia, the Northern Territory of South Australia, Queensland, and the north-eastern portions of New South Wales, specimens occasionally being obtained as far south as the County of Cumberland, and there is a skin of an adult female in the Australian Museum Collection, presented by Dr. Cullen, and procured by him at Hunter's Hill, near Sydney, on the 29th January, 1808. I met with this species, and often heard its note, frequently too throughout the night, during trips made to the Upper Clarence District and the Tweed River District, in the North-eastern portion of New South Wales. Flinder's Cuckoo evinces a decided preference for the coastal brushes, where fruit and berry-bearing trees abound, upon which it principally feeds. An adult female specimen sent me from the New England District, was shot while feeding on cherries in an orchard.

The prolonged and somewhat doleful notes, which Mr. G. Savidge likens to a "coo-ee," seems to be a feature of the northern rivers species, especially throughout the night, and this is often varied by the harsh notes of the next two species, *Scythrops nova-hollandia* and *Centropus phasianus*.

There is a variation in the colour of the upper parts of fully adult males, some having the feathers of the back and the scapulars distinctly shaded with blue or green, others with purple, spirit specimens assuming a dull oil-green colour on these parts. The wing-measurement of adult males varies from 7·8 inches to 8·6 inches.

Dr. W. Macgillivray writes me:—"Eudynamis cyanocephala arrives in the Cloncurry District, Northern Queensland, about the middle of December, with the first rains, and departs usually in March or April, although staying sometimes until May. Young ones have been seen during March tended by Yellow-throated Miners. The birds themselves are plentiful."

Mr. H. G. Barnard sends me the following note from Bimbi, Duarina, Queensland:—"Flinder's Cuckoo or Koel (*Eudynamis cyanocephala*) is very rare in this district. I have never

* Hist. Coll. Brit. Mus., Bds., p. 121 (1906).

taken its eggs, and the only birds I have seen feeding the young were a pair of Friar-birds (*Philemon corniculatus*). These Cuckoos seem to keep near the coast line, where berries are plentiful in the scrubs."

Three eggs of Flinder's Cuckoo, taken at Marton, near Cooktown, Queensland, by Mr. H. W. Munt respectively from the nests of the Silvery-crowned Friar-bird, the Sordid Friar-bird and Allied Oriole, are oval in form, the shell being close-grained, smooth and lustrous and of a very pale dull salmon-red ground colour, which is more or less covered, and particularly at the larger end, with numerous fleecy markings, streaks, and a few spots of darker and different shades of the ground colour intermingled with a few underlying markings of a washed-out violet-grey, a few of the spots or streaks on the outer surface being distinctly darker than the remainder. An egg taken from a nest of the Silvery-crowned Friar-bird, on the 18th February, 1901, measures—1·18 × 0·17 inches. Another egg taken from an Allied Oriole's nest on the 10th February, 1901, measures—1·3 × 0·92 inches.

An egg received on loan from Mr. G. A. Keartland, and taken by Mr. Munt at Marton, near Cooktown, Northern Queensland, is oval in form, the shell being close-grained and slightly lustrous. It is of a reddish-buff ground colour, with dots, spots and freckles of different shades of dull chestnut-red and purplish-grey, the latter colour appearing as if beneath the surface of the shell, all the markings as a rule being larger and more thickly disposed towards the larger end. Length 1·24 × 0·87 inches.

Respecting the taking of these eggs, Mr. Munt sent Mr. Keartland the following note:—
"On the 27th November, 1899, while out with Mr. Robert Hislop, Junr., at Marton, about five miles from Cooktown, we both saw a Flinder's Cuckoo fly from a nest of the Silvery-crowned Friar-bird (*Philemon argenticeps*.) On examining the nest Mr. Hislop found that it contained one egg, still quite warm, which was certainly not the egg of the Friar-bird. Three days later Mr. Hislop took three eggs from the nest, two of which were the eggs of the Silvery-crowned Friar-bird. The two eggs which I sent you were compared with the one Mr. Hislop had. One, the darker egg, was taken by me on the 6th February, 1900, from a nest of the Sordid Friar-bird. The other was brought me on the 10th February by a school boy, who said he had taken it from a nest of the Allied Oriole. All the nests from which these eggs were taken were built in broad-leaved *Acacia* trees, those of the Silvery-crowned Friar-birds being large open structures formed of pieces of bark and lined with dried grasses."

From Copmanhurst, on the Clarence River, New South Wales, Mr. George Savidge records as follows:—"The Koel (*Eudynamis cyanocephala*) is plentifully dispersed in all parts of the Clarence River District, and it may be seen and heard in open forest country, also in the dense scrub lands which abound on the Upper Clarence River. It arrives here in September and departs again about the end of March, and may be heard at night as well as in the day time, and its 'coo-ee' and other notes in quick succession are always welcome sounds. It is a restless bird, ever on the move, and seems to live an unenviable life; other birds chase and flog it unmercifully. I have seen Friar-birds attack it and force it to the ground, but that it can be the master when it chooses I have also seen. Upon one occasion I saw a Satin Bower-bird attacking it, and making a great noise. The foster parents of Flinder's Cuckoo in this district are usually the Friar-bird (*Philemon corniculatus* and *P. citreogularis*.) I have seen both these species feeding the young. It is very fond of the mulberry tree, which supplies it with both food and shelter; it also eats largely of the wild fig and other berries. An egg in my collection, taken from the oviduct of one of these birds, is similar to another found by me in the nest, containing an egg of the Friar-bird."

Mr. Savidge sent me for examination a set of two eggs of the Miner (*Myzantha garrula*), with an egg of *Eudynamis cyanocephala* taken from the same nest, together with the following

note:—"I am sending you a Koel's egg and two Miner's eggs (*Myzantha garrula*) all taken from the nest of the latter species. The nest was found by Mr. J. Calman, twenty-five feet from the ground, in a tree opposite Mr. H. Osborne's house, as you go towards Grafton. In company with Mr. E. H. Lane, who was staying with me at the time, and young Calman, we visited the tree, and all thought the nest was that of the Yellow-throated Friar-bird (*Philemon citreogularis*), in fact if we had seen the Miner leave the nest I doubt if we would have taken the trouble to place the rope ladder up to look into it, as it was in an awkward position to get at. On climbing near it young Calman managed to get all the eggs out of the nest at one scoop, and reported that one egg was very much larger than the other two. Had we known the treasure it contained we would have been more careful. On his reaching the ground we were both surprised and delighted to find that the eggs he had taken consisted of two Miner's eggs and a Koel's egg. In the same tree *Halcyon macleayi* and *Grallina picata* were nesting, and we obtained from the latter a most peculiarly marked set of five eggs."

This egg of Flinder's Cuckoo is oval in form, the shell being comparatively close-grained and slightly lustrous, and of a uniform pale reddish-salmon ground colour, over which is rather sparingly sprinkled dots and small irregular-shaped markings, and short wavy streaks of dull purplish-red and purplish-grey, the latter appearing as if beneath the surface of the shell, the markings predominating and being larger on the thicker end, where there are a few small light blotches of chestnut-red, some of which have a washed-out appearance, and partially conceal the smaller purplish-red markings. It more nearly resembles an egg of the Friar-bird or "Leatherhead" (*Tropidorhynchus corniculatus*) than that of any other species. Length 1.36 × 0.95 inches.

Immature males resemble the adult males, but have the edge of the wing mottled with white and the under wing-coverts with buffy-white; all the under surface is conspicuously mottled with rich ochreous-buff. Wing 8.3 inches. A specimen in the Australian Museum collection, procured by Mr. George Masters at Wide Bay in November, 1867, has a single brown quill, which has the remains of irregular rufous-buff cross-bars.

The eggs of Flinder's Cuckoo are usually laid in North-eastern New South Wales and Queensland from October until the end of February.

Genus SCYTHIOPS, *Latham.*

Scythrops novæ-hollandiæ.

CHANNEL-BILLED CUCKOO.

Scythrops novæ-hollandiæ, Lath., Ind. Orn., Vol. I., p. 141 (1790); Gould, Bds. Austr., fol. Vol. IV., pl. 90 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 628 (1865); Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 330 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 165 (1903).

ADULT MALE.—*General colour above, including the wings and tail, grey washed with light olive-brown, all the feathers of the back, scapulars, upper wing-coverts and quills broadly margined around their tips with brownish-black, the tail feathers with a broad sub-terminal band of brownish-black, and all but the central pair, which have narrow white edges, largely tipped with white; entire head and neck, mantle, throat and fore-neck grey, passing into greyish-white on the remainder of the under surface and under tail-coverts, the latter as well as the flanks barred with blackish-brown, and the thighs also showing indistinct traces of similar barrings; the under surface of the tail-feathers destitute of the light olive-brown wash and their inner webs toothed with white; each of the remaining*

grey toothings partially overlaid with a blackish-brown crescent. bill greyish-brown colour, whitish at the tip; legs and feet slaty-grey; iris red; bare skin around the eye red. Total length in the flesh 26.5 inches, wing 14.5, tail 11, bill 3, tarsus 1.8.

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales.

THE Channel-billed Cuckoo is widely distributed over the north-western, northern, and nearly the whole of the eastern portions of the Australian Continent, and according to Count Salvadori[†] also occurs in New Guinea, Duke of York Island, New Britain, Ké Islands, Ceram, Bouru, Obi, Batchian, Ternate, Celebes and Flores.

It has been recorded by Mr. G. A. Kearland and Dr. E. Hartert from the Fitzroy River and Derby, in North-western Australia, and from the Gulf of Carpentaria in Queensland, by



CHANNEL-BILLED CUCKOO.

Dr. E. P. Ramsay and Count Castlenau, and Mr. A. F. Smith has noted it at Ingham, on the north-eastern coast of that State. During many years residence at Ripple Creek, Herbert River, Mr. J. A. Boyd supplied me with dates of its arrival in that district, the earliest being the 13th September, 1888, the latest the 18th October, 1896, and the latest date of its departure 11th April, 1895. It is a spring and summer visitant to the north-eastern portion of New South Wales, and I have noted it from the Tweed to the Clarence Rivers. Mr. R. Grant, Taxidermist of the Australian Museum, procured specimens both at Cairns, Queensland, and on the Bellinger River, New South Wales. Mr. George Savidge presented three spirit specimens to the Trustees of the Australian Museum in February, 1897, which were ultimately sent to the Zoological Society, London, where they formed the subject matter of a paper by Mr. Frank E. Beddard, M.A., F.R.S., Prosector to the Society, entitled "On the Anatomy of an Australian Cuckoo."[‡]

After the breeding season is over, and usually in the early summer months, the Channel-billed Cuckoo, appears to wander away from its usual haunts, the northern coastal districts, and specimens have been received by the Trustees of the Australian Museum from the inland parts of the northern half of the State, and which may be recognised as the normal southern range of this species, although it has wandered as far south as Tasmania. Mr. George Masters informs me that he used to shoot these birds in the Fig trees, in the garden of the late Sir William Macleay, at Elizabeth Bay, Port Jackson, and Caley obtained the specimen referred to by Messrs. Vigors and Horsfield in the "Transactions of the Linnean Society of London," near Parramatta. A specimen was received in the flesh at

[†] Orn. Pap. et. Molucc., pl. ii., p. 373 (1880). [‡] Proc. Zool. Soc., 1898, p. 44.

the Australian Museum shot on the 12th December, 1896, near the Macquarie River, about one hundred miles below Dubbo. Another was shot at Leadville, two hundred and thirty miles west of Sydney, while in the act of eating whole apricots.

Fruits and berries of various kinds form the staple article of diet, which is sometimes varied with insects. A stomach of one examined contained the seeds of a Fig and the heads, legs and elytra of beetles, among them being those of a species of *Anoplognathus*.

It is impossible to give any idea of the loud, harsh and discordant notes of this species, which may be frequently heard during the night as well as in the daytime, but when once heard they cannot be confounded with those of any other species.

Mr. G. A. Keartland, who was a member of the Calvert Exploring Expedition in 1896-7, in Western and North-western Australia, sends me the following notes:—" *Scythrops novaehollandiæ* makes its appearance in the Fitzroy River District, North-western Australia, in the early months of the year, January or February, and just about the time of the tropical rains. It is generally known as the 'Storm Bird.' As soon as its loud notes are heard the Crows and Hawks appear to be excited. They attack it from all sides, but the snapping of the huge bill of the *Scythrops* warns its enemies to keep away. It is impossible to say how many eggs it lays, but one female I shot had four well developed yolks on its ovaries. When the young Channel-bills leave the nest the foster-parents are most attentive to their wants. Whilst the foster-parents live chiefly on flesh, all the Channel-bills I have shot had nothing but small black figs in their gullets. I have known two young ones to be taken from the nests of the Western Brown Hawk (*Hieracidea occidentalis*) and the Crow (*Corvus coronoides*)."

Dr. W. Macgillivray writes me as follows:—" *Scythrops novaehollandiæ* is fairly common in the Cloncurry District, Northern Queensland, arriving about the middle of December and departing again about the end of April or early in May. Single young Channel-bills are most often seen tended by a pair of Crows, and pairs occasionally. A Channel-bill has been known to throw young *Grallina* out of their nest."

From Bimbi, Duaringa, Queensland, Mr. H. G. Barnard reports:—" *Scythrops novaehollandiæ* is very rare in this district, but I have seen it in numbers on the coast and in the north feeding on the wild figs. That it does breed here occasionally is proved by the fact that some years ago I saw a pair of Black-backed Magpies (*Gymnorhina tibicen*) feeding a fully fledged young one. There are very few native berries in the scrubs in this part, although they form one of the principal foods of these birds."

Mr. Robert Grant has given me the following note:—"I found the Channel-billed Cuckoo on the Bellinger River, in New South Wales, and in the coastal scrubs of the Cairns District, North-eastern Queensland. They usually go about in flocks, varying from about three to nine in number, and keep to the tops of the tallest trees, where they join each other in a chorus of harsh, yelling cries, more especially before rain, or when they are menaced by danger. On one occasion I saw five or six of them in a very excited state, flying from branch to branch, and uttering their unpleasant cry. On looking upwards I discovered a carpet snake, about six feet long, hanging down from one of the branches, hence the cause of their alarm. The stomachs of those examined contained seeds and berries of different kinds, also grass-hoppers and other insects."

Mr. George Savidge has kindly sent me the following notes from Copmanhurst, on the Upper Clarence River, New South Wales:—"The Channel-billed Cuckoo (*Scythrops novaehollandiæ*), or more usually called the 'Fig Hawk' by the Clarence River residents, is more plentifully dispersed on the Upper Clarence River than on the low lying flat lands nearer the coast. It may be seen and heard daily in the virgin scrub on Susan Island, opposite Grafton, and wherever the wild Fig abounds you are almost certain to find the Channel-bill. It is a migratory species, arriving

here about the end of September and departing again early in March. As far as I have observed it feeds almost entirely on the wild Figs, but no doubt it eats other fruits as well. A friend of mine told me they came daily to his Mulberry tree. It makes an unearthly screaming noise at night, as well as day. At the end of the breeding season they may be found in small flocks of six or seven, after which they soon depart. The foster-parents here are the Crow and Pied Crow Shrike; both species attack them vigorously and chase them away. The Aborigines here have seen *Strepera graculina* feeding the young.'

Mr. H. L. White, of Belltrees, Scone, New South Wales, has kindly favoured me with the following notes:—"During my residence of twenty-five years in this district I have paid a good deal of attention to *Scythrops nova-hollandiæ*, which is fairly plentiful here, generally arriving the first week in August and remaining with us until about the end of December. Belltrees is situated on the Hunter River, at a point where the valley is some eight miles wide, the range on the east or coast side running up to 5000 feet, while that on the west is about 2000 feet. The Channel-bill during its residence here appears to make a regular haunt of the higher range, flying across usually early in the morning to the western range to feed upon the wild Figs, which are rather plentiful there. On the 11th November, 1904, at daylight I shot a female as she flew over my house here, and whose stomach was full of wild figs freshly eaten, thus proving that the bird had fed during the night. On dissecting the body I found it contained four immature eggs. When the Channel-bill flies low and utters its harsh cry, we consider it a pretty sure sign that rain is not far off, but at other times I have watched the birds apparently feeding on insects in high Eucalyptus trees, when not a sound would be heard from them for hours. I know of three eggs of this species being taken in this locality, all from the nest of the Black-backed Magpie (*Gymnorhina tibicen*), in each case the egg being fairly like the Magpie's clutch. In 1906 a Channel-bill laid in a Raven's nest near here, in an inaccessible position, and was seen about the nest for weeks. Upon another occasion I saw a Raven feeding a young *Scythrops* which had left the nest. The favourite foster-parent, however, appears to be *Strepera graculina*, that is judging from the many cases when I have seen the *Strepera* feeding, or in company with, the young Cuckoo. A local kangaroo shooter, a keen observer, tells me that he has seen a *Strepera graculina* feeding two young Channel-bills. Although I have taken fifteen clutches of *Strepera graculina* eggs, with *Scythrops* plentiful in the immediate locality, I have never been fortunate enough to secure the Cuckoo egg with that of the *Strepera*. *Scythrops nova-hollandiæ* receives a very warm time of it when in the vicinity of a Crow, Magpie or Pied Crow Shrike's nest."

Two eggs were received from Mr. Philip P. Schrader by the Trustees of the Australian Museum, in 1888, who has since sent me the following information: "The eggs of the Channel-bill, were sent to me in the spring of 1886, by a friend from Cryon, near Pilliga, New South Wales, who stated they were taken with two Crow's eggs, from a nest of that bird, by Mr. W. L. Humphries, who was at that time manager of the station. In 1878, while at 'Montana,' a place on the crest of the Dividing Range, about half way between Walcha and the Hanging Rock, I had the good fortune to yard three wild brumby bulls, which were so fierce that they had to be shot in the yard. The carcasses being skinned were removed some short distance, and soon attracted several species of carrion eaters, among others a pair of the Australian Raven (*Corone australis*). Hearing one morning the peculiar sounds of young birds being fed, my attention was drawn to this pair of Ravens feeding two young Channel-bills, fully fledged, quite able to fly, but with short tails. The whole family stopped near the carcasses for several weeks, the young Channel-bills being fed all the time on good sized pieces of meat, daily growing more clamorous for food, and unmercifully pestering the unfortunate foster-parents. They did not leave the place until the food supply ran out. During a collecting trip to North-eastern Queensland, in 1902, I found the Channel-bill very plentiful about Cairns and

at the foot of the range at Redlynch. They used to go about in flocks of from six to fifty individuals, this was during September and October, and there was no sign of their pairing. They used to visit the Fig trees on the banks of the Barron River and Freshwater at regular feeding hours. I have never had the good fortune to find the eggs of *Scythrops nova-hollandie*, but I have seen the Raven (*Corone australis*) and the Pied Crow-Shrike or 'Black Magpie' (*Strepera graculina*) feeding young Channel-bills as foster-parents."

An egg in Dr. G. Hurst's collection, taken from the oviduct of a bird shot during the first week in November, 1884, at Kempsey, on the Macleay River, New South Wales, is of a dull white ground colour, with faint purplish dots and spots, and a few of light yellowish-brown, with which are intermingled on the thicker end underlying markings of brown and pale purplish-brown forming on one side a confluent patch. All the markings are ill-defined, and the egg closely resembles a very large and washed-out specimen of *Grallina picata*. Length 1.5 × 1.05 inches. The two eggs in the Australian Museum collection, received from Mr. Schrader in 1888, are oval in form, the shell being coarse-grained and slightly lustrous. One is of a warm buff ground colour, which is covered with freckles, clots, spots and small irregular-shaped blotches of different shades of brown and similar underlying markings of pale purplish-brown and violet-grey, the markings being larger on the thicker end. Length 1.75 × 1.2 inches. The other specimen is of a lighter ground colour, and is thickly and uniformly covered all over with pepper and salt markings of different shades of brown and umber-brown, intermingled with similar underlying markings of violet-grey. Length 1.85 × 1.25 inches. These eggs are figured on Plate B. XXI., Figures 11 and 12. An egg received on loan from Mr. H. L. White, of Belltrees, Scone, is a thick oval in form, tapering somewhat sharply towards the smaller end, lustrous, and of a pale greyish-buff ground colour, which is thickly covered with faint irregular-shaped spots and blotches of different shades of pale brown, intermingled with similar irregular-shaped underlying markings of faint purplish and violet-grey, and which are larger on the thicker end, where they form a very small and irregular-shaped cap; the underlying spots and blotches give the general colour of this egg a dull greyish shade. Length 1.6 × 1.18 inches.

An egg of the Channel-bill taken from a nest of *Strepera graculina*, which also contained two eggs of that species, by Mr. S. Robinson at Warkon Station, on the Condamine River, South-western Queensland, is an elongate-oval in form, somewhat pointed at the smaller end, the shell being comparatively close-grained, smooth and slightly lustrous; it is of a pale yellowish-brown ground colour, spotted and blotched all over, but particularly at the larger end, with brown and inky-grey, the latter colour forming clouded patches, in some places large, in others small and very faint, and consisting chiefly of underlying markings. Length 1.82 × 1.18 inches. In shape, character and colour of markings this egg resembles that of one of the Waders, and more particularly a small and pointed one of *Burhinus grallarius*. Mr. Robinson saw the Channel-bill sitting on the Pied Crow Shrike's nest, which flew around and made a great noise as he was taking the eggs.

Immature birds resemble the adults, but have the feathers of the upper parts, including the wings, broadly tipped with brown, passing into white on some of the inner primaries; the feathers of the head are also mottled with brown, the breast and abdomen being transversely barred with dull dusky-grey, with a slight pale ochreous-brown wash. Wing 12.75 inches.

Sub-family CENTROPODINÆ.

Genus CENTROPUS. *Müller.***Centropus phasianus.**

COUCAL.

Cuculus phasianus, Lath., Ind. Orn., Suppl. II., p. xxx. (1801).

Centropus phasianus, Gould, Bds. Austr., fol. Vol. IV., pl. 92 (1848); *id.*, Hand-b. Bds. Austr., Vol. I., p. 634 (1865); Shelley, Cat. Bds. Brit. Mus., Vol. XIX., p. 340 (1891).

Centropus macronus, Gould, Bds. Austr., fol. Vol. I. Introd. p. 68 (1848); *id.*, Bds. Austr., fol. Vol. IV., text 20, pl. 92 (1848); *id.*, Hand-b. Bds. Austr., Vol. I., p. 636 (1865).

ADULT MALE.—*Head, neck, mantle and all the under surface dull black, the rigid spine-like shafts glossy bluish black; wings chestnut alternately barred with black and buff; the outer series of the lesser and median wing coverts very pale buff, with transverse blackish bars, their shafts yellowish-white; the quill shafts chestnut; lower back, rump and upper tail coverts dull brownish-black, the latter with a greenish lustre and having narrow transverse buff cross-bars; tail-feathers black, whitish around the tips, with dark or buffy-white broken cross-bars; bill blackish-brown; legs and feet slaty-grey; iris red. Total length in the flesh 24 inches, wing 10.5, tail 15.5, bill 4.6, tarsus 2.*

ADULT FEMALE.—*Head, hind-neck and mantle chestnut, with straw white shaft stripes, those of the latter bordered or barred on either side with black; wings and tail as in the male; all the under surface buffy white with paler shaft streaks, the feathers on the sides of the fore-neck and upper breast chestnut towards their margins, with a broken longitudinal line of dull black; lower flanks, vent and under tail-coverts dull black with buffy-white cross-bars. Wing 9.5 inches.*

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales.

IN favourable situations the Coucal, or “Swamp Pheasant” as it is more commonly called, is found throughout the coastal and contiguous district of North-western, Northern and the greater portion of Eastern Australia. There are specimens in the Australian Museum collection obtained by Mr. E. H. Saunders near Roeburne, and by Mr. E. J. Cairn at Derby, North-western Australia, by the late Mr. Alexander Morton at Port Essington, in the Northern Territory of South Australia, and from Cairns by Messrs. E. J. Cairn and Robt. Grant, and Wide Bay, Queensland, by Mr. George Masters. Mr. Frank Hislop has noted it as common in the brushes of the Bloomfield River, and Mr. J. A. Boyd in the Herbert River District. In New South Wales it is represented by numerous specimens collected in the northern coastal districts of the State, its range extending south as far as the Illawarra District, where occasional specimens are obtained.

I met with this species in the Upper Clarence District, during two visits there, frequenting the trees on the river banks; also on the sides of a creek running through Hackett's Scrub. In actions it reminded me very much of *Struthida cinerea*, as when disturbed from the ground it rapidly ascended a tree, jumping from branch to branch until near the top, when it took flight. Near Sydney solitary individuals are sometimes obtained, particularly during the summer months, in the swampy undergrowth at Narrabeen and Greenvale, also along the banks of George's River at Como, and at Port Hacking. An adult female presented to the Trustees of the Australian Museum, was shot by M. Leon Jaubert at Thornleigh, on the 15th July, 1896.

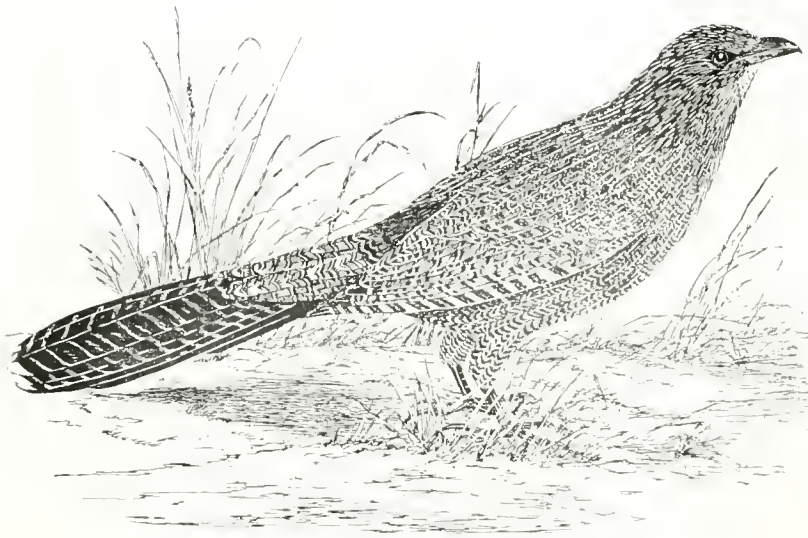
The stomachs of these birds are thin-walled and semi-transparent. That of M. Jaubert's specimen was absolutely crammed with more or less perfect examples of the Yellow-winged Grasshopper (*Locusta danica*). Their insect diet is varied with small lizards, field mice and young birds.

Dr. W. Macgillivray writes me:—"In the Cloncurry District, Northern Queensland, *Centropus phasianus*, once fairly common, is now becoming scarce: it is always a shy bird, and resents any intrusion on its haunts."

Dr. E. P. Ramsay records:—" *Centropus phasianus* preys on mice and small animals, holding them with its feet, and tearing them to pieces if they are too large. I once had a pair of *Centropus* in confinement, and although scarcely nine months old they readily killed mice or young rats when let go in their cage, first picking them up quickly in their bill and rapping them smartly against the sides of the cage, they soon killed them; but often a peck in the back

with their strong bills killed or disabled the animals at once. They eat raw meat, grasshoppers, lizards, frogs or bread readily, and appear to be omnivorous."

Mr. Robt. Grant, Taxidermist, who has collected a number of these birds on behalf of the Trustees of the Australian Museum, in the Bellinger River District, N.S. Wales, and the Herberton District, North-eastern Queensland,



COUCAL OR "SWAMP PHEASANT."

has given me the following notes:—"On the Bellinger River I always found the Pheasant-Coucal (*Centropus phasianus*) in the neighbourhood of swamps, and about reed-margined creek and river banks. These birds have a peculiar habit when disturbed of running to the butt of the nearest tree, and jumping or hopping up the branches, as if they were going up a ladder, until they get to the top, when they fly downwards again, and generally to the ground. The nests I have seen were on the ground, large, and roughly built in a tuft of coarse grass, or in rushes near the water, domed over the top, and with two entrances. One contained five eggs; they were rough shelled, dirty white in colour, and nest stained. I also found this species rather common on the table-lands of the Herberton District, North-eastern Queensland. The stomachs of all contained the remains of lizards, frogs, beetles and other insects."

While resident at Ripple Creek, Herbert River, North-eastern Queensland, Mr. J. A. Boyd kindly sent me the following notes:—" *Centropus phasianus* may always be found here, and apparently breeds at any time. On the 17th November, 1863, I was shown a nest of *Centropus phasianus* from which three young ones had lately flown. It was in a bunch of rushes a few yards from the river; the tops of some of the rushes had been broken and bent down to form a platform some two feet from the ground, and on this was placed a layer of green Tea-tree leaves; there was no lining of any sort, merely a slightly depressed platform, the outer rushes being

* Proc. Zool. Soc., p. 601 (1875).

drawn together and matted so as to form a sort of screen over the nest. On the 24th February, 1894, a gin brought me in five eggs of *Centropus*. On the 6th April, 1897, an aboriginal brought me three eggs of *Centropus phasianus*; there were four in the nest, but he broke one. They were heavily incubated."

From Coomooboolaroo, Duaringa, Queensland, Mr. Charles Barnard sent me the following note: "On 15th February, 1891, I took a nest and three eggs of the Swamp Pheasant (*Centropus phasianus*). The nest was built about fifteen inches above the ground, in some high broad-bladed grass, the tops of which were drawn down and inter-woven loosely into the shape of a ball about eight inches in diameter, with a round hole in one side for entrance and another at the opposite side as a means of exit, as, by reason of the birds long tail, it is unable to turn in the nest, and, on being alarmed, hops right through the nest. The inside at the bottom was thickly padded with Bloodwood (*Eucalyptus corymbosa*) leaves, which extended through the entrance and on to the bent down grass outside the nest, which was built against the stem of a small tree, very likely for protection, as the grass all round appeared equally suitable for nesting purposes."

Writing me from Bimbi, Duaringa, Queensland, in November 1908, Mr. H. G. Barnard remarks:—" *Centropus phasianus* has entirely left this district owing to heavily stocking the country, and droughts which have cleared off the long grasses and herbage along the water-courses. Several nests were found years ago, but I have no *data* as to the month or year. The nests were constructed of the tops of the long grass, woven together and lined with leaves of trees, with an entrance back and front. Number of eggs for a sitting from three to six."

Mr. Edwin Ashby sends me the following note: "I observed *Centropus phasianus* frequenting the swampy ground near the Glass-house Mountains to the north of Brisbane, Queensland, and have on two occasions seen them sitting on posts on the side of the railway line, and so interested was the bird at the passing train, that it kept its head facing the engine, hopping around on the other side of the post in order to watch the retreating train. I have received a skin of this species, with rather darker plumage, from the Northern Territory of South Australia."

From Copmanhurst, Clarence River, New South Wales, Mr. George Savidge sends me the following notes: "The Pheasant-Coucal is plentifully dispersed in suitable places from the Clarence Heads to the mountains separating the Upper Clarence from New England District. At Yamba it frequents the low swampy marshes close to the sea, and can frequently be heard in the cane fields along the river bank to as far up the river as Ulmarra. About Copmanhurst it is usually found along the creeks and water courses, and where coarse grass and rough herbage abounds, although it may be seen along the river banks in very rough, steep, rocky places. When Quail shooting the dogs seldom miss them, and when flushed they fly to the nearest tree and ascend by leaps from branch to branch until they reach the top, when, if disturbed, they fly to another tree. Sportsmen in this locality shoot them, as they have the reputation of eating small birds and young Quail, but I cannot say I have ever seen proof that they do so, although it is generally accepted that they are very fond of robbing the nests and sucking the eggs of the farmer's fowls. The nest is usually placed in long coarse grass, also rushes and sword grass, and upon one occasion I found one with young just hatched out on the top of a thick Lantana bush. I visited this nest about four days after, for the purpose of taking a photograph, but the young had gone; if nothing had disturbed them they must leave the nest at an early age, which probably they do. The nests I have found usually contain three or four eggs; upon one occasion I found five in a nest, which is a loose dome-shaped structure, containing two openings, and is lined with gum leaves; it is made by bending and twisting some of the material down into a receptacle for the leaves, and by arching some over the top. The call of this bird may be heard for a considerable distance. The flesh is very coarse and red looking, and not at all palatable."

Mr. G. A. Kearnland records: "Until I saw *Centropus phasianus* in West Kimberley, North-western Australia, I wondered why they were often called "Swamp Pheasants," but there they were running over the burnt ground, or amongst the tussocks in a dry swamp, scratching up their food like domestic fowls, or darting after passing insects. When disturbed they escaped by running if possible, but should a dog approach them they flew into the branches of the large trees, and ran along the limbs, or jumped from branch to branch. I often located them by listening for their peculiar note, which somewhat resembles that of the Boobook Owl. The local natives call it the "Book Book."

The nest is a large globular structure with an entrance at either side for ingress and exit, in the northern coastal rivers of New South Wales it is frequently formed in a tussock of Blady-grass, the tops of which are drawn together, and is lined at the bottom with a thick pad of dried Eucalyptus leaves. Usually it is built in a tuft of grass, but sometimes in a low bush. Both in the Bloomfield and Herbert River Districts, in North-eastern Queensland, the lower leaves of the Screw Palm (*Pandanus aquaticus*) is one of the commonest nesting sites for this species.

The eggs vary from three to five in number for a sitting, and in form from a rounded to an elongated oval, and are of a dull white, the shell being fine grained, smooth and slightly lustrous. Three eggs of a set of five taken by Mr. J. A. Boyd at Ripple Creek, Herbert River, Queensland, measure: Length (A) 1.53 × 1.23 inches; (B) 1.39 × 1.17 inches; (C) 1.48 × 1.2 inches. An unusually elongated set of four, taken by Mr. George Savidge at Copmanhurst, measures: — (A) 1.58 × 1.15 inches; (B) 1.0 × 1.11 inches; (C) 1.5 × 1.05 inches; (D) 1.52 × 1.05 inches.

Young birds, when a few days old, are queer looking creatures, and are covered all over with spine-like white hairs.

November to the end of March constitutes the usual breeding season in Eastern Australia. Mr. Boyd informs me that he found three nests on the 24th February, 1897, two of which contained two eggs and the other one egg, all being fresh, and that a nest with three fresh eggs was taken near Townsville in May, 1898. Odd nests may be found throughout the remainder of the year. Mr. Frank Hislop informs me that at Wyalla, on the Bloomfield River, North-eastern Queensland, he placed three incubated eggs of this species in his collecting box, and that on his arrival home some hours later all the eggs were hatched.

ORDER PSITTACI.

Family LORIIDÆ.

Genus TRICHOGLOSSUS, Vigors and Horsfield.

Trichoglossus novæ-hollandiæ.

BLUE-BELLIED LORIKEET.

Psittacus nova-hollandiæ, Gmel., Syst. Nat., tom. I., p. 316 (1788).*Trichoglossus sarasinii*, Gould, Bds. Austr., fol. Vol. V., pl. 48 (1848).*Trichoglossus multicolor*, Gould, Handbk. Bds. Austr., Vol. II., p. 93 (1865).*Trichoglossus nova-hollandiæ*, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 57 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 5 (1900); Salvad., Ibis 1905, p. 118.

ADULT MALE.—Head and throat blue, the centre of each feather of the head and cheeks having a satiny sheen forming a lighter shaft stripe; a band on the nape yellowish-green; remainder of the upper surface green; bases of the feathers of the inter scapular region bright yellow washed with crimson, in some specimens the crimson in others the yellow predominating; outer webs and tips of quills green, their inner webs blackish-brown with an oblong spot of bright yellow in the centre, forming a band through the wing; external web of the first primary black; four central tail-feathers green, shaded with blue towards the tips; the remainder green on their outer webs, bright yellow on their inner webs, which decreases in extent towards the central feathers; under surface of the tail yellowish, deeper in tint on the inner webs of the lateral feathers; chest and breast crimson, some of the feathers in the centre fringed with deep blue; sides of the breast orange-yellow, more or less tipped with crimson; centre of the abdomen deep blue, the sides crimson mottled with yellow and tipped with green; under tail coverts yellow, mesially tipped with green and washed with crimson at the base; acillaries and under wing-coverts bright crimson; bill red; legs and feet grey; iris, orange or reddish yellow. Total length in the flesh 12.5 inches, wing 6.4, tail 6, bill 0.8, tarsus 0.53.

FEMALE.—Similar in plumage to the male.

Distribution.—Queensland, New South Wales, Victoria, South Australia, Tasmania.

THE Lorikeets, Cockatoos and Parrakeets numerically form one of the largest groups of birds inhabiting Australia; at the same time, the various members of it are more familiarly known to residents, as many are kept as pets or cage birds. A large export trade is done in the live birds, principally with Europe and England, and these are eagerly sought for on arrival, some of the rarer species commanding high prices. Several works of a more or less popular kind have been published, dealing principally with them while in captivity. They form, too, the subject matter of many communications made to the "Avicultural Magazine" of London, which is devoted chiefly to recording the various phases of the life history of birds, while in confinement. Hybrids and abnormally plumaged birds are more common in this than in any other Order of Australian birds.

The different species of Lorikeet play an important part in the fertilization of flowers, and principally in the blossom of the various species of *Eucalypts*, during their search for food, their brush-like tongue being so well adapted for collecting the nectar or pollen on which they chiefly live.

The range of the Blue-bellied Lorikeet, or "Blue Mountain Parrot," as it is more frequently called, extends throughout the greater portion of the coastal and adjacent districts of Eastern

Australia, occurring near Adelaide, in South Australia, and as far north as Cairns in Queensland. Specimens from the latter locality are slightly smaller and have the feathers of the head of a brighter blue than examples obtained near Sydney.

Individual variation exists in this species, some adult specimens having the upper parts of a uniform green, others having the bases of some of the feathers on the back yellow or red, or an admixture of the two colours. One mounted specimen in the Australian Museum collection, has the feathers on the sides of the nape and the ear-coverts yellowish-red.

In New South Wales, when there is an abundance of Eucalypts in blossom, these birds are in some seasons extremely plentiful, but they are far less numerous of late in the neighbourhood of Sydney than they were ten or fifteen years ago. At Blacktown they used to be very common, and were usually found feeding in company with *Glossopsittacus concinnus* and *G. pusillus*. Snaring "Blueys," as they were locally called by boys in the western suburbs of Sydney, was a favourite pastime from about the beginning of January until the end of April. Numbers used to be brought into the Sydney bird-dealers shops, but they are now seldom to be seen. M. Octave Le Bon informed me that this bird lives very well in confinement, if it is a dry season and there is a dearth of *Eucalypti* in blossom, for then they take readily to a seed diet and thrive well. If, however, there is an abundance of their usual food, they have to be gradually broken into subsisting on seed, by feeding them on sugar and oatmeal, &c., and are not then worth the trouble of keeping with a view to future sale in Europe or elsewhere. These birds are incorrigible fruit eaters, and do much damage in orchards, especially with the soft summer fruits.

Their shrill shrieking notes are usually uttered while on the wing, or passing from one tree to another. The flight is rapid and uncertain; sometimes a flock will fly direct into a tree at such a speed as if the birds intended to pass between its branches, but will then suddenly alight; another time they will pass by a tree, and with a graceful curve return and slowly settle in it. What a sight is a "feeding tree" when in blossom at the latter end of May, or early in June, in any of the coastal districts of New South Wales. At Seven Hills and Blacktown, or between Manly and Narrabeen, there used to be many of them; the air is perfume laden from the fragrant blossom of the flowering *Eucalypti*, and one hears the incessant chatter of several species of Lorikeets, as they nimbly climb and twist and turn in all directions to extract with their hairy and brush-like tongues the nectar from the flowers. In the stomachs of the three common species of Lorikeets found near Sydney, *Trichoglossus nova-hollandiæ*, *Glossopsittacus concinnus* and *G. pusillus*, I have often found the remains of beetles; some were absolutely crammed with them.

Mr. Robert Grant has kindly given me the following note:—"While collecting on behalf of the Trustees of the Australian Museum, in 1888-9, in the Cairns and Herberton Districts, North-eastern Queensland, *Trichoglossus nova-hollandiæ* was everywhere found to be very numerous. In the main street of Cairns there used to be a large Fig-tree, and these birds could be seen coming and going all day long, and their incessant chattering and screeching used to be almost deafening at times. At Boar Pocket, in the month of September, numbers could be seen clinging to the trunks of trees we used to call 'weeping pines,' which had drooping branches like a willow. These birds were apparently feeding upon a resinous exudation, which seemed to affect them, giving them a dazed and stupid look. I have very often seen them lose hold of the trunks of those trees, fall to the ground, roll over, then get on their legs and give their wings a flap or two, and remain there ten or fifteen minutes before they could recover and fly off to some other trees. Birds we caught, while thus affected, or shot, were useless as specimens, as their plumage was more or less covered with this sticky juice or resinous exudation."

Under date 31st May, 1888, Mr. J. A. Boyd writes me from Ripple Creek, Herbert River, North-eastern Queensland:—"Yesterday I took from a nesting-place a pair of nearly fledged

young Blue Mountain Parrakeets, and my black boy tells me of another lot of young. As we are now almost in the middle of winter, with the thermometer for the last week at daylight ranging from 44° to 47° , it seems a strange time for these birds to breed, the more so as December and January are their usual breeding months here." And again on the 14th November, 1889:—"Many young *Trichoglossus nove-hollandiæ* now flying about." Also on the 11th October, 1895:—"Blue Mountain Parrakeets are very plentiful, feeding in a blossoming Bean-tree within a few yards of the house. I got a very young one a couple of days ago."

Mr. H. G. Barnard sends me the following notes from Bimbie, Duaringa, Queensland:—" *Trichoglossus nove-hollandiæ* breeds from June to December, and lays two eggs for a sitting, the site selected being a hollow spout in any species of Eucalyptus, dead or alive, the eggs being placed from one to two feet from the entrance. When the female is sitting the male bird collects honey from the flowering trees, returning to the nest shortly before sundown, enters the hollow, where he remains for a short time while presumably feeding the female. Both birds then leave the hole, returning just after sundown, when they re-enter and remain for the night. At one time these birds bred freely in this district, but I have not seen a nest since the big drought of 1902."

From Copmanhurst, Upper Clarence River, New South Wales, Mr. George Savidge writes me as follows:—" *Trichoglossus nove-hollandiæ*, usually called here the Blue Mountain Parrot, is plentifully dispersed throughout the Clarence River District. The nesting place is in the hole of a branch of the Blue or Spotted Gum tree, and sometimes in the bole of the tree itself. The nesting season commences early, the first set of eggs being laid during the first or second week in June, and they rear successive young till the end of December or January. The eggs are always two in number, and are laid on the debris of decayed wood. At this time they are generally found in pairs, but later on, early in January or February, they assemble in large flocks, and do considerable damage to the young corn by tearing away the husk and leaving the cob exposed to the weather, when it soon rots. They also obtain their food among the blossoms of our Eucalypts, but these birds no longer remain to be shot as they did in Gould's time, and sometimes I have found them difficult of approach."

Mr. G. A. Keartland writes me as follows from Melbourne, Victoria:—"About thirty-six years ago *Trichoglossus nove-hollandiæ* was very numerous near Melbourne. In fact these birds used to come in large flocks and feed on the blossom of the Blue Gum (*Eucalyptus globulus*) which then flourished in the Parliament Reserve and other public gardens. They suddenly ceased coming, the last time I saw them in numbers being in 1874, when they were a perfect pest in the orchards at Dandenong, and I shot forty-five without moving from one spot near a couple of large Pear trees, the fruit of which they completely destroyed. Since then I have only seen three birds in all my rambles near Melbourne, but I am informed they are numerous at certain seasons in the neighbourhood of Casterton, in the Western District."

While resident at Hamilton, Victoria, Dr. W. Macgillivray sent me the following notes:—" *Trichoglossus nove-hollandiæ* is numerous throughout the district, and destroys a great quantity of fruit annually, and is not at all particular as to the kind of fruit, seeming able to assimilate the hardest Pear as easily as the softest Plum. This is not to be wondered at when one finds that this bird, which in a state of nature lives on nothing but the honey of the Eucalyptus, can so adapt itself to altered conditions of life as to live on grain in captivity. I have a record of one which lived in a small aviary for seventeen years, never getting any other food than wheat and canary seed. The Blue Gums in the streets of Coleraine bloomed continuously from May until November one year, and provided during the whole of this period a continued feast for immense numbers of these birds, as well as other honey-eaters. Adult birds captured by being trapped or stunned, live well in captivity, and soon become reconciled to their lot."

From Blackwood, South Australia, Mr. Edwin Ashby writes me :—"During the last six years I have only seen one pair of *Trichoglossus nova-hollandiæ* in the neighbourhood of Blackwood, but this year has been a remarkable exception. From the 10th May, 1908, small flocks of from ten to twelve individuals were continually visiting the Blue Gums in my garden, and at an earlier date than this flocks were visiting the gardens on the plains, where they were eating pears. Now at the end of August they have almost disappeared from our neighbourhood. I have been over twenty years in South Australia, and have never before seen this species in such numbers."

Dr. W. A. Angove sends me the following note from Tea-tree Gully, near Adelaide :--
 " *Trichoglossus nova-hollandiæ* is scarce, although there are practically always a few about. They nest in the Peppermint Gums about Mount Crawford, in the Barossa Scrub."

For the purposes of breeding, like nearly all the species of this Order inhabiting Australia, it resorts to a hole in a tree, sometimes in a dead hollow branch, but often in a living one, the eggs being deposited on the decaying wood found in these cavities; the height is usually from twenty to sixty feet from the ground. At Copmanhurst, on the Upper Clarence River, all the nesting places of *Trichoglossus nova-hollandiæ* and *T. chlorolepidotus* pointed out to me by Mr. George Savidge, were in different species of Eucalyptus, some of them in dead trees whose branches were insufficient to bear the weight of a young Aborigine whom he used to employ to procure them. It was wonderful to watch how rapidly the latter could ascend, without any apparent exertion, the thick dead trunk of one of these trees, with the smallest notch holes in which to insert his toes. With open palms and wide-spread fingers he reminded me of a huge lizard as he ascended to the nesting-places of either species. All I saw in that district were mostly in large timber.

The eggs are two in number for a sitting, and vary from rounded-oval to oval in form; others are slightly pyriform at the smaller end. They are dull white, and are usually much nest-stained, from the decayed wood on which they are laid, so much so, that some are of a uniform pale-brown hue; the shell is smooth and lustreless. A set of two taken by Mr. H. G. Barnard at Coomooboolaroo, Duaringa, Queensland, on the 23rd November, 1892, measure :—Length (A) 1.1 × 0.9 inches; (B) 1.08 × 0.9 inches. A set of two taken by Mr. G. Savidge at Copmanhurst, on the Upper Clarence River, on the 21st June, 1895, measure :—Length (A) 1.12 × 0.93 inches; (B) 1.11 × 0.92 inches. Another set, taken by Mr. Savidge in the same locality on the 6th July, 1896, measure—Length (A) 1.25 × 0.94 inches; (B) 1.18 × 0.92 inches.

The breeding season is variable, as will be seen by the previously quoted notes. On the Herbert River, North-eastern Queensland, Mr. J. H. Boyd observed young in May, October and November, and also records it breeding in December and January. In 1893 I received from Mr. H. G. Barnard three sets taken by him that year at Coomooboolaroo, respectively on the 23rd August, the 23rd September and the 23rd October. At Copmanhurst, Upper Clarence River, New South Wales, Mr. Savidge has taken eggs as early as June, and has observed young birds at the latter end of July, also in August, and again in January and February.

Trichoglossus rubritorquis.

RED-COLLARED LORIKEET.

Trichoglossus rubritorquis, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 291 (1826); Gould, Bds. Austr., fol. Vol. V., pl. 49 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 95 (1865); North, Vict. Nat., Vol. XVI., p. 12 (1899).

Trichoglossus rubritorques, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 60 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 5 (1900); Salvad., Ibis, 1902, p. 419.

ADULT MALE—*Head and throat rich blue, the centre of each feather of the head and cheeks having a satiny sheen forming a lighter shaft-stripe; chest, breast and a nuchal collar deep orange, more or less streaked with crimson, except at the tips of the feathers; a band on the hind neck deep blue; feathers of the interscapular region crimson tipped with deep blue next the hind neck, and green on the lower portion, bases of the feathers yellow; wings green, inner webs of quills blackish brown, with an oblong spot of yellow in the centre forming a band through the wing; two central tail feathers green washed with blue at the tips, the next on either side green edged with yellow on their inner webs, the remainder green on their outer webs, yellow on their inner webs; under surface of the tail yellowish, deeper in tint on the inner webs of the lateral feathers; a narrow band on the lower throat and the centre of the abdomen deep bluish-black tinged with green, the feathers on the sides crimson tipped with deep blue or green; flanks and under tail-coverts yellow tipped with green; acillaries and under wing-coverts bright crimson; bill red; legs and feet greyish-brown; iris reddish-orange. Total length in the flesh 12 inches, wing 6, tail 6, bill 0.8, tarsus 0.65.*

ADULT FEMALE—*The sexes are alike in plumage.*

Distribution—North-western Australia, Northern Territory of South Australia, Northern Queensland.

UNLIKE the preceding species, which has an extensive range, the Red-collared Lorikeet is restricted to the northern portion of the continent. It may be distinguished chiefly by its brighter blue head, red collar on the lower part of the nape, the deep blue band on the hind-neck, and its darker lower breast and abdomen. The late Mr. Alexander Morton, collecting on behalf of the Trustees of the Australian Museum in 1879, obtained specimens at Yam Creek and Port Essington, in the Northern Territory of South Australia. Mr. E. J. Cairn and the late Mr. T. H. Bowyer-Bower obtained specimens in 1886 near Derby, in North-western Australia, and in the same part of the continent Mr. G. A. Kearland saw, in May, 1897, a few pairs feeding on the blossom, but did not obtain specimens. Evidently they were breeding, as he saw the Aborigines cooking nestlings, and later on in Derby saw a beautiful pair that had been taken from a nesting place, and were then in the possession of the Government Resident, Dr. F. M. House. In "Novitates Zoologicae," Dr. E. Hartert has also recorded specimens from Derby, likewise from the South Alligator River and Eureka, in the Northern Territory of South Australia.

Mr. F. Kruger had a number of these birds in Sydney, early in 1908, among others he had brought from the Northern Territory of South Australia. They were feeding well on maize meal and sugar, also canary seed. He informed me he had taken many of this species to Europe, but lost some of the birds during the voyage.

Mr. G. A. Kearland received the eggs of this species, taken by Mr. E. J. Harris from a hollow limb of a Eucalypt, about twenty miles south-east of Derby, North-western Australia, in May, 1898, accompanied by a skin of the female, procured at the same time. The eggs are rounded-oval in form, the shell being close-grained, smooth and lustreless, white and much nest stained, and measure:—Length (A) 1.1 × 0.9 inches; (B) 1.08 × 0.91 inches.

Genus PSITTEUTELES, *Bonaparte*.**Psitteuteles chlorolepidotus.**

SCALY-BREADED LORIKEET.

Psittacus chlorolepidotus, Kuhl., *Consp. Psitt.*, p. 48 (1820).

Trichoglossus chlorolepidotus, Gould, *Bds. Austr.*, fol. Vol. V, pl. 50 (1818); *id.*, *Handbk. Bds. Austr.*, Vol. II, p. 96 (1865).

Psitteuteles chlorolepidotus, Salvad., *Cat. Bds. Brit. Mus.*, Vol. XX., p. 65 (1891); Sharpe, *Handl. Bds.*, Vol. II, p. 6 (1900); Salvad., *Ibis*, 1905, p. 121

ADULT MALE.—*General colour above and below grass-green; crown of the head tinged with blue; interscapular region, lower sides of the neck, throat and breast yellow, each feather having a terminal crescent of grass-green; feathers of the throat and sides of the body occasionally washed with crimson; primaries and secondaries blackish-brown, green on their outer webs and tips, except the outermost primary on either side, which is narrowly edged with yellow, the under surface of all the quills with an oblong spot of pale crimson on the median portion of the inner web, increasing in extent and depth of colour towards the innermost secondaries, this part of the quills on the upper surface distinctly spotted with yellow; under surface of the tail yellowish, the basal half of the lateral feathers slightly washed with crimson on their inner webs; acillaries and under wing-coverts bright crimson; bill red; legs and feet light olive-grey; iris orange-yellow. Total length in the flesh 9.5 inches, wing 5.25, tail 4.3, bill 0.68, tarsus 0.5.*

ADULT FEMALE.—*The sexes are alike in plumage.*

Distribution.—Queensland, New South Wales.



SCALY-BREADED LORIKEET.

OF the various members of the family Loridae inhabiting Australia, the Scaly-breasted Lorikeet is one of the most restricted in its range. Regarding *Psitteuteles neglectus* only as a smaller northern race, and not specifically distinct from the present species, the neighbourhood of Cooktown, in Queensland, to the Hawkesbury River in New South Wales, may be regarded as the extent of its normal range. That it does occasionally occur in the northern parts of the County of Cumberland there is no question, but I have never seen a specimen obtained in the neighbourhood of Sydney for many years past, nor have I ever observed at any time a skin in any collection formed south of the metropolis. It chiefly frequents the coastal and contiguous mountain districts of these parts of Eastern Australia, and is never found in the dry inland portions of New South Wales. At Copmanhurst, on the Upper Clarence River, I have noted it

feeding in the flowering Eucalypts, specimens being obtained there in November, 1907. I have also seen it as far south as Ourimbah and Gosford; at the former locality Dr. G. Hurst found it breeding in December, and secured a set of two eggs.

* Reichenow, *Orn. Monatsb.*, VII., p. 4 (1898).

There is a variation in the wing-measurement of specimens obtained in the coastal districts of North-eastern and South-eastern Queensland, and as so frequently occurs in other species, the further north the specimens are procured, so are they smaller. The wing-measurement of adult males procured at Cairns, by Messrs. E. J. Cairn and Robt. Grant, on behalf of the Trustees of the Australian Museum, is 4·8 inches; that of an adult male obtained by Mr. George Masters at Maryborough, Wide Bay, in South-eastern Queensland, is 5·25 inches. Abnormal colouring is also common in the plumage of this species. Frequently examples are found with some of the feathers of the interscapular region more or less washed with crimson, or scattered spots of this colour on the breast. One specimen in the Australian Museum Collection has the bases of all the feathers of the interscapular region, the throat and breast more or less washed with crimson.

Gould's remarks, "that on suspending a fresh shot specimen by the toes a large tea spoonful of liquid honey will flow from the mouth," is applicable also to *Trichoglossus nove-hollandiæ*, *Glossopsittacus concinnus*, *G. pusillus*, and undoubtedly all members of the family Loriidae. I have never measured the quantity, but my experience with these species inhabiting South-eastern Australia, is that the nectar is disgorged and the feathers soiled if the bird is only wounded; if dead it is advisable to let it drip from the bird, as it hangs head downwards, before placing it away in paper.

At Copmanhurst, on the Upper Clarence River, this species breeds principally in the standing rung timber, resorting to a spout or hollow branch, and depositing its eggs, two in number, on the decaying wood or dust found in these cavities, the nesting places I saw averaging from twenty to sixty feet from the ground. It is remarkable that a large number of nesting places of this species, first found by Mr. H. Greensill Barnard, at Coomoooolaroo, Duaringa, Queensland, contained far more frequently a single egg for a sitting than they did two, the almost invariable number found on the Upper Clarence River, New South Wales, for a sitting, and where, too, as a rule, the breeding season is much earlier.

From Bimbi, Duaringa, Queensland, Mr. H. G. Barnard writes me:—"*Trichoglossus chlorolepidotus* almost invariably breeds when the Swamp Gums (*Eucalyptus*) are in flower. In 1907 they bred plentifully; the following are the dates of three sets taken in that year—27th July, 3rd and 6th August. In 1908, owing to the great amount of rain in March, the Gums flowered earlier than usual, and on my return from a trip to Brisbane, I examined several nests in the early part of August, but found only young birds. The weather had then set in dry, and breeding stopped. In a good season I have taken fresh eggs up till the end of November. These birds breed in the holes in the limbs of the Gum trees, generally selecting a place from which a thin dead branch has fallen, and chip away the decayed wood till they reach the hollow in the centre of the limb; the eggs, two in number, are placed on the soft decayed wood at the bottom of the hole, which is usually about a foot from the entrance. A pair which I had under observation close to the house, were six weeks eating their way into a limb, until the eggs, two in number, were deposited. The nesting places are generally very high, the heights of the three nests taken being sixty-nine feet, seventy-two feet and seventy-seven feet."

Mr. George Savidge sends me the following notes from Copmanhurst, New South Wales:—
"The Scaly-breasted Lorikeet is plentifully dispersed all through the Clarence River District, and it prefers the cultivated fields and open flat country. The nesting season usually commences the first week in June, and continues till the end of February, the earliest set taken by me was on the 23rd May. By the third week in June all have eggs or young birds; the nest is placed in a hole or the bole of a tree, sometimes as far as six feet from the entrance, and the height from the ground varies from nine to sixty feet. Two eggs are always laid for a sitting; upon one occasion only did we find three; several broods are reared each season. In suitable places it is still numerous, but their numbers in this locality are decreasing. In the autumn it

may be seen feeding on the nectar of the various Eucalyptus in company with the Blue-bellied Lorikeet. It is a good talker, but is a quarrelsome bird when nesting. I have on many occasions seen several locked together fighting until they gradually reached the ground. I remember upon two occasions my son running up and placing his hat over them before they could release their grip of one another."

"The first nest of *Trichoglossus chlorolepidotus* I discovered quite by accident, on the 3rd June, 1895, as I would not think of looking for them at this time of the year. I noticed a bird fly direct into a hole in a branch of a dead Eucalyptus. After watching to see if it would come out, I tapped the trunk, when out it flew, and when passing the tree in the evening I tapped the trunk, and again it came out. On the blackfellow climbing the tree he found two eggs in the hollow. Since then I have taken several sets, some too much incubated to blow, and several of the nesting-places contained recently hatched young birds. The nesting-places are mostly high up, and some of them in dead horizontal branches would not bear the weight of the blackfellow sufficiently enough for him to climb out and examine them. I have taken fresh eggs as late as the 28th September, and have seen young birds just able to fly as early as the third week in June, and again in January and February."

The late Mr. George Barnard, in sending me the eggs of this species, informed me that he found the Scaly-breasted Lorikeet breeding in the hollow spouts of the lofty Eucalyptus in the neighbourhood of the Dawson River, Queensland, and that all the nests, seven in number, taken by his sons, unlike that of any other species of the family Loriidae, contained but a single egg in each, which in some instances were much incubated.

The eggs are typically rounded-ovals in form, pure white when just laid, but soon become stained with the moist and decayed wood on which they are deposited, some specimens now before me being of an almost pure pale coffee-brown hue; the shell is close-grained, smooth and lustreless. A set of two taken by Mr. George Savidge at Copmanhurst, New South Wales, on the 26th July, 1895, measure:—Length (A) 1·02 × 0·82 inches; (B) 0·96 × 0·8 inches. A set taken in the same locality on the 28th September, 1895, measures:—Length (A) 1·01 × 0·81 inches; (B) 1·02 × 0·78 inches. Another set taken measures:—Length (A) 1·04 × 0·84 inches; (B) 1·04 × 0·82 inches.

The breeding season is variable, commencing usually about the end of May or early in June, and continues until the end of February.

Genus PTILOSCLERA, *Bonaparte*

Ptilosclera versicolor.

VARIED LORIKEET.

Trichoglossus versicolor, Vig., in Lear's Ill. Parr., pl. 36 (1832); Gould, Bds. Austr., fol. Vol. V., pl. 51 (1848).

Ptilosclera versicolor, Gould, Handbk. Bds. Austr., Vol. II., p. 98 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 66 (1891); Sharpe, Handl. Bds., Vol. II., p. 6 (1900); North, Agric. Gaz. N. S. Wales, Vol. XIII., p. 409 (1902); Salvad., Ibis, 1905, p. 422.

ADULT MALE.—Lores and crown of the head rich red; cheeks and nape deep blue, the former with bright yellow and the latter with yellowish-green shaft stripes; a narrow band on the occiput; the interscapular region, back and upper wing-coverts light grass-green, with yellowish-green shaft stripes; rump and upper tail-coverts light grass-green; tail-feathers light green, yellowish on their

inner webs: primaries and secondaries green, margined with blackish-brown on their inner webs: ear-coverts bright yellow: chest dull purplish-red, brighter on the sides, each feather with a narrow shaft stripe of bright yellow: remainder of the under surface and under tail-coverts yellowish-green: bill red: feet dark ashy-grey. Total length 7 inches, wing 4.8, tail 3, bill 0.6, tarsus 0.48.

ADULT FEMALE.—*Resembles the male, but is much duller in colour, and has the red cap on the head smaller.*

Distribution—North-western Australia, Northern Territory of South Australia, North Queensland.

THE Varied Lorikeet is an inhabitant of the northern portion of the Australian continent. At Cape York, Northern Queensland, the late Mr. J. A. Thorpe collected specimens in 1867-8, the late Mr. Edward Spalding obtained specimens at Port Darwin, and the late Mr. Alexander Morton at Port Essington, in the Northern Territory of South Australia. Mr. E. J. Cairn procured specimens near Derby, in 1886, and Mr. G. A. Kwartland near the junction of the Fitzroy and Margaret Rivers, North-western Australia, in 1896-7. M. Octave Le Bon informed me he obtained living examples at Wyndham, and also procured specimens on the opposite side of the continent, near Burketown, in the Gulf District, Northern Queensland, in 1902; and Dr. W. Macgillivray writes me that in the Cloncurry District, about two hundred miles further south, "flocks of *Ptilosclera versicolor* find an ample supply of food during the flowering of the Bloodwood and other Eucalypts."

M. Octave Le Bon informs me he succeeded in taking a number of these birds to Europe in 1902, feeding them principally upon a thick paste of maize meal and sugar, and gradually changing their diet until they subsisted almost wholly on Canary seed.

This species appears to be subject to much variation in colour. The finest pair of skins in the Australian Museum Collection was obtained by Mr. E. J. Cairn, near Derby, North-western Australia, in 1886. The cheeks, sides of the face and neck of the adult male are of a much deeper blue than is shown in Gould's upper figure of this species in his folio edition of the "Birds of Australia," and the yellowish-green shaft stripe at the tips of the feathers on these parts are smaller and finer; none of the Australian Museum specimens have the lower breast and abdomen so broadly streaked with yellow as is there represented, these parts being almost uniform in colour. Another specimen in the collection has the feathers of the mantle, upper portion of the back, the fore-neck and sides of the breast, strongly suffused with cinnabar-red, which is relieved on the under parts of the body by yellowish-green shaft-streaks.

Mr. Kwartland sent me the following note when forwarding the eggs of this species for description in 1902:—"In December, 1896, immense flocks of *Ptilosclera versicolor* visited several Box trees which were in blossom, in the vicinity of our camp, near the junction of the Fitzroy and Margaret Rivers, North-western Australia. As they moved rapidly amongst the foliage, their scarlet crowns were very conspicuous, suggesting the idea that the trees were adorned with brilliant scarlet flowers. A number afterwards bred in the hollow branches of trees growing along the Margaret River. In habits, mode of flight and notes, they bear a close resemblance to *Glossopsittacus concinnus*. The eggs of *Ptilosclera versicolor*, I send you for description were taken by Mr. E. J. Harris on the 6th May, 1901, from a hollow spout in a low gum tree, about thirty feet from the ground, near the Margaret River. They were quite fresh, and were laid on the dry decayed wood about eighteen inches from the entrance."

These eggs are a swollen ellipse in form, pure white, the shell being close-grained, dull and lustreless. Length:—(A) 0.91 × 0.76 inches; (B) 0.93 × 0.73 inches.

Immature males resemble the adult female.

Genus GLOSSOPSITTACUS, Bonaparte.

Glossopsittacus concinnus.

MUSK LORIKEET.

Psittacus concinnus, Shaw, Nat. Miscel., pl. 87 (1791).

Trichoglossus concinnus, Gould, Bds. Austr., fol. Vol. V., pl. 52 (1818).

Glossopsitta australis, Gould, Handbk. Bds. Austr., Vol. II., p. 100 (1865).

Glossopsittacus concinnus, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 69 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 6 (1900); Salvad., Ibis, 1905, p. 422.

ADULT MALE.—General colour above and below grass green; forehead and ear coverts bright red; crown and sides of the head washed with blue; feathers of the fore part of the cheeks contrasted with bright bluish-green; hind neck and interscapular region olive-brown; primaries and secondaries blackish-brown, green on their outer webs and tips, except on the outermost primary, which is but narrowly edged with green; on the sides of the breast an irregularly-shaped patch of bright yellow; under surface of the tail washed with yellow, bases of the inner webs of the four outermost feathers on either side red; bill blackish-brown, changing into reddish-orange at the tip; feet pale yellowish-grey; iris orange. Total length in the flesh 9 inches, wing 5, tail 3½, bill 0·6, tarsus 0·5½.

ADULT FEMALE.—Similar in plumage to the male.

Distribution—Queensland, New South Wales, Victoria, South Australia, Tasmania.

THE range of the Musk Lorikeet extends throughout the greater portion of Eastern Australia, and it is likewise found in Tasmania. It is more freely distributed in the coastal districts, and chiefly haunts the forests of flowering Eucalypts. In the summer and autumn months it is usually without exception the commonest species of any member of the Order Psittaci occurring near Sydney, although I have never myself found it, or heard of its breeding in the vicinity. Its appearance is greatly governed by the food supply, and in some seasons it is far more abundant than others, and it is more common in the western suburbs of Sydney than it is close to the coast. When living at Dobroyde, Ashfield, in 1889, large flocks used to fly over from February to the middle of April, fairly high in the air, resembling in form a wave or the spray left on a long beach by a receding wave. These flocks were about three hundred yards in width, and three or four birds deep, and were travelling from the south-west to the north-east, and were probably a quarter of a mile apart. They could be seen at almost any time of the day, from early morning until nearly sunset. Numbers of these birds were allured and caught by means of a captive call-bird in a cage and a snare pole. The trap consists of a long pole about twenty feet long, which is placed in a socket, and has at the top one or two thin forked limbs, which fairly bristled with horse-hair nooses. A pulley is usually attached, so that the cage containing the call or decoy bird can be lowered as required. Three seasons in particular during my residence in Ashfield and Canterbury the Musk Lorikeets were unusually numerous, from the end of January to the middle of April, 1889, 1893 and 1896. From my note-book I make the following extract of one season:—"18th March, 1893:—For the past five weeks large flocks of *Glossopsittacus concinnus* have been passing over Ashfield and all the western suburbs, thousands of which have been caught by means of snare poles. It seems strange that these birds, when once they alight on one of these poles, repeatedly come back until they are eventually entangled in one of the many horse-hair nooses with which the forked extremity of the snare pole is covered. These poles may be seen as one passes through from Parramatta to Petersham, even from the window of a railway carriage, and are usually erected

in yards or gardens, and attended to by school children or the average boy. The number caught in a day varies: I met one boy who informed me that he had caught one hundred and twenty, but even in a good season the average all through would be about ten a day. In M. Octave Le Bon's bird shop I heard many inquiries if he wanted to purchase 'keets' from men, women and boys, but he was not disposed to, even at one shilling and six pence per dozen. The mortality amongst these birds must be very great, as one seldom sees them in captivity in winter or spring."

The Musk Lorikeet has the usually shrill shrieking notes of the family Loriidae. Were it not for the cries of the decoy or call-birds, many thousands would never lose their liberty, for it is the answering notes of the call birds which arrest these flocks, or portion of them, in their flight.

The usual food of this species consists of nectar extracted from the flowering Eucalypts, and frequently, when wounded, they would disgorge a quantity and soil their feathers: insects too are sometimes eaten, and these birds are a perfect scourge some seasons in orchards and vineyards. In the summer and autumn of 1896 they devastated entire orchards in the coastal districts of the State, and loud complaints were made through the newspapers. They were particularly numerous about the Hawkesbury River, and about Wollongong and Kiama, and many thousands were killed, but without any apparent diminution in their numbers. Shooting did not deter them or frighten them away, and so tame were they that many were killed with sticks while feeding in the trees, or were caught by hand. About Sydney they attacked chiefly pears and plums, but in some districts everything in the shape of fruit was eaten. I have also met with the species in great numbers near Dromana, Victoria.

Individual variation is common in this species, and usually consists of many of the feathers of the breast and of the hind-neck being more or less yellow. Mr. Robert Grant brought me an interesting specimen in the flesh for examination on the 8th July, 1909, having a large patch on the upper flanks, the whole of the back, rump and primaries, and the greater portion of the secondaries and scapulars rich yellow, and the feathers on the nape shaded with lilac.

Mr. George Savidge sends me the following note from Copmanhurst, on the Upper Clarence River, New South Wales:—" *Trichoglossus concinnus* has only been observed by me once in this district. It was in the month of August, and the bird appeared to be very tame, and was feeding on the flowering Gums."

While resident at Hamilton, in Western Victoria, Dr. W. Macgillivray sent me the following note—"The Musk, Little and Porphy-crowned Lorikeets are all very numerous throughout the district, and are to be found in company with the Blue Mountain and smaller members of the swift flying Lorikeets, wherever the Gums are blooming. Nesting depends largely upon this also, and may be in early spring or late in summer."

From Melbourne, Victoria, Mr. G. A. Keartland writes as follows:—"During the summer and autumn months *Glossopsittacus concinnus* is to be found in large flocks wherever the Eucalypts are in blossom, but in the latter part of spring they are generally seen in pairs. Sometimes several pairs breed in the same tree. Of late they have taken a fancy to fruit, and become a serious pest to orchardists, who often resort to poison to get rid of them, as shooting fails to scare them away. I have seen as many as fifty-six shot off one large tree, without the rest of the flock taking alarm. One fruit grower at Wandin, Victoria, who laid poisoned grain, gathered two wheel-barrowsful of them from under his fruit trees two weeks in succession without any apparent diminution in their numbers. Nestlings thrive well on a mixed diet of bread and sugar and canary seed, and when six months old will repeat several short sentences. They are the best talkers amongst our small Psittaci, but seldom live long in confinement."

Mr. Edwin Ashby sends me the following note from South Australia:—"Flocks of *Glossopsittacus concinnus* visited Blackwood early in the autumn of 1908, and did a great deal of

damage in the orchards, especially to the pears, which seem their favourite fruit. They then disappeared for a fortnight or more, no doubt following the ripening of the fruit on the higher ranges. By the 10th May they returned in large flocks, and were in the Blue Gums collecting honey from the flowers the same as the other three species of Lorikeets frequenting the district."

Dr. W. A. Angove writes me from Tea-tree Gully, South Australia:—" *Glossopsittacus concinnus* is most abundant, at times the whole district being alive with them. They follow the flowering of the Gums, and are most destructive to fruit, especially apples. A fruit grower at Houghton killed a large number in 1908 by poisoning the fruit with strychnine; he gathered over one thousand, which shows how numerous they are at times. Although consistently hunted for, I know of one nest only having been found. This was at Mount Pleasant, in 1907, the nesting-place being situated in the hollow spout of a Gum, and a young bird was taken which is now in the finder's possession."

Dr. L. Holden writes from Tasmania under date 12th February, 1898:—" *Glossopsittacus concinnus* are now devastating a friend's Pear trees at Rokeby. Ordinarily we do not see them here, but this has been a season of long drought and large bush fires. I saw a large flock yesterday in the Beltana-road. They are noisy on the wing and in the trees, but their cries are not so shrill as those of *Lathamus discolor*, and their flight is much slower. Vast numbers are reported from the orchards and gardens about Hobart."

Mr. Thos. P. Austin has kindly forwarded the following notes from Cobborah Station, Cobborah, New South Wales:—" About March, after the breeding season is over, *Glossopsittacus concinnus*, accompanied by *G. pusillus*, arrives from the north in very large flocks, and their harsh screeching notes, heard as a few hundred of them suddenly fly from a tree, only a few feet above one's head, is anything but pleasant music. I have examined many nests of this handsome little bird, and upon every occasion found two eggs or two young. For a breeding place they usually choose a very small hole, or in the elbow of a limb of a tree, mostly in living Red Gum trees (*Eucalyptus rostrata*). Anyone wishing to know if a hole in a tree is occupied by these birds, without chopping it out, if he can get his nose near the hole it will be quite sufficient, as the strong musky odour will tell him. These Lorikeets appear to cultivate a taste for fruit of almost any variety, and have become a great pest to orchardists in many districts."

When I was on a visit to Cobborah Station, Mr. Austin climbed to a nesting-place of the Musk Lorikeet, on the 12th October, 1909, in a hole in a large Red Gum about sixty feet from the ground, and overhanging a bank of the Talbragar River: on chopping a hole in the limb it was in, he found a recently hatched young one in down, and an addled egg. Mr. Austin also cut out two more nesting places of Parrakeets from the same tree, revealing in one four and the other five recently hatched birds, but too young to ascertain to which species they belonged, but probably *Psephotus haematonotus*. On the following day he chopped out a nesting-place of a Musk Lorikeet, in a hollow green branch of a Gum-tree forty feet from the ground, in the River Paddock, which contained two incubated eggs, the latter being three feet six inches from the entrance to the hole. There were also two Whistling Eagles' nests in the same tree, from one of which Mr. Austin informed me he had taken two eggs on the 17th July, 1907, and also a Raven's (*Corone australis*) nest, from which he took a set of six eggs on the 11th July, 1908. Three young Brown Hawks (*Hieracidea orientalis*) were also bred in the nest during the same season, and on the 3rd September, 1909, he also took from it a set of three Brown Hawk's eggs.

On the 14th October Mr. Austin climbed, by means of a rope ladder to a nesting-place of the Musk Lorikeet, in a thick green hollow branch of a Red Gum, on a bank of the Talbragar River. Two days before we had seen the bird come to the entrance and then go back again. After slightly enlarging the entrance, he was enabled to get his arm in the cavity, and succeeded in reaching a single fresh egg, which he left. This nesting place was only eighteen feet from

the ground, and was the lowest one Mr. Austin informed me that he had ever found. Visiting it two days later the bird was found still sitting in the limb on the single egg. This is the nesting-place I photographed, and is here reproduced.



NESTING-PLACE OF MUSK LORIKEET.

The breeding place is in a hole in a limb of a tree, and the eggs, two in number for a sitting, are laid on the decayed wood and dust found in these cavities.

Typically the eggs are nearly globular in form, but ellipses and swollen ovals are not uncommon; they are white, the shell being close-grained, smooth and lustreless. A set of two taken near Dubbo, New South Wales, measure:—Length (A) 1·01 × 0·79 inches; (B) 1·02 × 0·8 inches. A set of two taken at Byng, New South Wales, by Mr. S. Robinson, on the 9th November, 1865, measure:—Length (A) 0·98 × 0·82 inches; (B) 0·97 × 0·83 inches. Another set taken on the same date measure—Length (A) 1·05 × 0·87 inches; (B) 1·04 × 0·85 inches. A set of two taken by Mr. Thos. P. Austin, from a hole in a tall Red Gum tree, near a bank of the Falbragar River, Cobborah Station, Cobborah, New South Wales, on the 29th August, 1908, measure:—Length (A) 1 × 0·8 inches; (B) 0·94 × 0·81 inches.

A recently hatched young one, taken from the nesting-place by Mr. Austin, on Cobborah Station, on the 12th October, 1909, was covered with greyish-white down; bill brown, the tip black; legs and feet flesh colour, the latter strongly washed with grey; eyes only partially opened, and the iris apparently brown.

August and the four following months constitute the usual breeding season.

Glossopsittacus pusillus.

LITTLE LORIKEET.

Psittacus pusillus, Shaw, in White's Journ. of a Voy. to N. S. Wales, p. 262, pl. 48 (1790).

Trichoglossus pusillus, Gould, Bds. Austr., fol. Vol. V., pl. 51 (1848).

Glossopsitta pusilla, Gould, Handbk. Bds. Austr., Vol. II., p. 103 (1865).

Glossopsittacus pusillus, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 71 (1891); Sharpe, Handl. Bds., Vol. II., p. 6 (1900); Salvad., Ibis, 1905, p. 422.

ADULT MALE.—General colour above and below grass green; face red; ear-coverts centred with brighter green; hind-neck and interscapular region olive brown; primaries and secondaries blackish-brown, green on their outer webs except the first primary; under surface of the tail-feathers yellowish; inner webs of all but the two centre feathers red at the base; bill black, base of the lower mandible dull reddish-orange; feet olive-grey; iris orange. Total length in the flesh 7.2 inches, wing $\frac{1}{2}$, tail 2.5, bill 0.75, tarsus 0.4.

ADULT FEMALE.—Similar in plumage to the male, but slightly smaller and duller in colour on the face.

Distribution—Queensland, New South Wales, Victoria, South Australia, Tasmania.

PRECISELY similar to the preceding species is the range of the Little Lorikeet, and these birds are often found in company with one another. In Australia it appears to be equally abundant in all the Eastern States, and was the first species of the family Loridae in Victoria of which I obtained specimens. Near Sydney it is extremely abundant, in some seasons, from April to the end of June, in the neighbourhood of Toongabbie, Seven Hills and Blacktown. In the former locality, on one occasion I shot a number of them, while feeding in company with *Glossopsittacus concinnus*, and several species of Honey-eaters. Repeated firing into the tree failed to disturb these birds as their compatriots fell wounded and screeching to the ground. Like that species, too, the feathers of the head and neck became soiled with the nectar they disgorged as they fell from the tree. Although the smallest species of Lorikeet, a wounded bird can inflict a severe bite if incautiously handled.

The food of this species is principally nectar, extracted from the various species of Eucalypts. I have never known it to attack cultivated fruits, nor to be caught like *Glossopsittacus concinnus* or *Trichoglossus nova-hollandiae* on snare poles.

Mr. H. G. Barnard, of Bimbi, Duaringa, Queensland, has sent me the following notes:—“On the 5th September, 1908, I was chopping out a nest of the Little Lorikeet (*Glossopsittacus pusillus*), and on opening the limb found young birds, and to my surprise there were a number of the common fowl ticks crawling about on the inside of the hole. Now how did the ticks come there, for the fowl tick is an importation, and a deadly one among domestic poultry. The nesting place was thirty feet from the ground, and fully half a mile from our fowl-house, where we have the fowl ticks, but the Little Lorikeets never come near the place. The young birds did not seem to be affected in any way by the ticks. *Glossopsittacus pusillus* is very plentiful here, and I took many sets in 1907, but was too late for them in 1908. The same notes that I have given on *Psittentiles chlorolepidotus* applies also to this species, except that the number of eggs laid for a sitting is four instead of two.”

From Copmanhurst, Upper Clarence River, New South Wales, Mr. George Savidge sent me the following note:—“The Little Lorikeet is by far the scarcest of the three species of Lorikeet that inhabit the Clarence River District. It is usually found in pairs or small flocks of five or six birds, sometimes in company with the others, and were it not for their screech it would not often be noticed. It is an early breeder, commencing to lay about the end of June; the eggs are usually four (I once found five), which are placed on the decayed wood in a hole of a tree, usually high up. This species makes a very interesting pet, and talks well.”

From Melbourne, Victoria, Mr. G. A. Keartland wrote me in March, 1909:—“Many years ago *Glossopsittacus pusillus* was to be seen wherever Eucalyptus trees existed around Melbourne, but about eighteen years ago they became very scarce, and five years elapsed before I could shoot a pair for specimens. However, they are now to be seen or heard everywhere as soon as the blossom appears on the trees. During a visit to Wagga, on the Murrumbidgee River, New South Wales, I saw three broods of young ones of different ages in the same tree. As soon as fully feathered the young ones are coloured and marked almost exactly like their parents.”

From Blackwood, South Australia, Mr. Edwin Ashby writes:—“*Glossopsittacus pusillus* is decidedly scarce among the hills near Adelaide, but in 1908 they were everywhere, although in nothing like such great numbers as *G. porphyrocephalus*.”

Dr. W. A. Angove sends me the following note from Tea-tree Gully, South Australia:—“*Glossopsittacus pusillus*, in very small numbers, is with us most of the year, and frequents the Blue Gum saplings. I have never known it to breed here.”

From Cobborah Station, Cobbara, New South Wales, Mr. Thos. P. Austin writes me as follows:—“*Glossopsittacus pusillus* remains here throughout the year in small flocks, but a great many of them arrive about March, and most of them depart again before the breeding season commences. Their nests are often very difficult to discover, as it is usually a very small hole on the top side of a limb, in such a position that it cannot be seen from the ground, but often in the elbow of a limb of a tree, and unless one sees a bird go into the hole he will probably never disturb the bird from its nest without climbing to it, as they are very close sitters. I have found more of their nests by accident, that is when climbing to the nest of some other bird, than any other way. I have found them nesting in the same tree as the Musk Lorikeet. On the 29th August, 1908, Mr. B. C. Cox and myself found in two trees growing within a few feet of each other two nests of the Musk Lorikeet, one of the Little Lorikeet, and one of Barnard's Parrakeet (*Barnardus barnardi*), this being the only occasion I have seen the latter birds here.”

While I was on a visit to Cobborah Station, Mr. Austin climbed a dead Box tree, on the 14th October, 1909, and chopped into a hollow branch about forty five feet from the ground, in which he found two fresh eggs of the Little Lorikeet. On the following day he climbed another tree on a bank of the Talbragar River, and found three young ones just ready to leave the nesting-place. He also found in the same tree nesting-places of the Rose-hill Parrakeet and the Red-rumped Parrakeet, both containing young birds. Another nesting-place of the Little Lorikeet containing young birds was examined the following day, the sitting bird coming out of the entrance hole on our arrival; the site of this breeding-place was in a thick hollow green branch, about fifteen feet above the water of the Talbragar River.

This species breeds in the hollow limb of a tree, and the entrance is usually small, and has to be chopped away to secure the eggs. I also met with it breeding at Narrabri, in November, 1897, in large Gum trees, but failed to secure any eggs. Like *Glossopsittacus concinnus*, although common at some seasons, I have never known it to breed in the neighbourhood of Sydney.

The eggs are usually four, rarely five, in number for a sitting, some specimens being almost globular in form, others rounded-oval, dull white, and usually nest-stained, the shell being close-grained, smooth and lustreless. A set of four taken by Mr. H. G. Barnard at Coomooboolaroo, Duaringa, on the Dawson River, Queensland, on the 25th August, 1893, measure:—Length (A) 0.77 × 0.67 inches; (B) 0.8 × 0.67 inches; (C) 0.82 × 0.62 inches; (D) 0.75 × 0.67 inches. A set of three taken by Mr. Barnard in the same locality, on the 1st September, 1895, measure:—Length (A) 0.8 × 0.64 inches; (B) 0.78 × 0.65 inches; (C) 0.8 × 0.64 inches. Another set of four was taken on the 16th September, 1893. A set of four eggs in Mr. Thos. P. Austin's collection, taken at Cobborah Station, Cobbara, New South Wales, from a nesting-place in a hollow branch of a dead Box tree, seventy feet from the ground, measure:—Length (A) 0.81 × 0.64 inches; (B) 0.8 × 0.67 inches; (C) 0.8 × 0.67 inches; (D) 0.79 × 0.67 inches; (E) 0.8 × 0.66 inches. A set of two Musk Lorikeet's eggs were taken in the same tree on the same day. A set of five Little Lorikeets' eggs were found on the 1st August, 1908, but two eggs were broken by the chips falling on them.

A young bird taken from a nesting-place in the hollow of a tree at Cobborah Station, Cobbara, on the 14th October, 1909, resembled the adult, but the red face was smaller and

paler, the edge of the wing and the nape yellower, and the breast more yellowish-green; bill olive-brown; the lower mandible yellowish; cere grey; skin around the eye bluish-grey; legs and feet fleshy-grey, the soles of the feet dingy dull yellow. When restored to liberty this bird was able to fly well away.

This species is an earlier breeder than *Glossopsittacus concinnus*, August and the three following months constituting the usual breeding season in Queensland and New South Wales.

Glossopsittacus porphyrocephalus.

PORPHYRY-CROWNED LORIKEET.

Trichoglossus porphyrocephalus, Dietr., Trans. Linn. Soc., Vol. XVII., p. 553 (1837); Gould, Bds. Austr., fol. Vol. V., pl. 53 (1848).

Glossopsitta porphyrocephalus, Gould, Handbk. Bds. Austr., Vol. II., p. 102 (1865).

Glossopsittacus porphyrocephalus, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 70 (1891); North, Ibis, 1894, p. 261; Sharpe, Hand-l. Bds., Vol. II., p. 6 (1900); Salvad., Ibis 1905, p. 422.

ADULT MALE.—*Lores dull crimson; forehead orange tinged with red; crown of the head deep purplish-blue; feathers above and below the eye, the occiput and nape yellowish-green; interscapular region olive washed with green; shoulder and lesser wing-coverts bright blue; upper wing-coverts and scapulars green; rump and upper tail-coverts grass-green; primaries and secondaries blackish-brown, their outer webs green externally edged with yellow; primary-coverts blackish-brown, green on their outer webs and tips; tail green, inner webs and under surface yellowish washed with crimson at the base of the lateral feathers; ear-coverts red, edged and tipped with orange; throat, breast and centre of the abdomen pale bluish-grey; flanks and under tail-coverts light green tinged with yellow, the former washed with red; axillaries and under secondary coverts bright crimson; bill black; feet bluish-flesh colour; iris dull brown with a narrow ring of orange round the pupil.* (Gould). Total length in the flesh 7.4 inches, wing 4.3, tail 2.8, bill 0.5, tarsus 0.43.

ADULT FEMALE.—*The sexes are alike in plumage, but in many apparently adult females examined the ear-coverts are much paler, and the flanks and inner webs of the lateral tail-feathers are destitute of the crimson wash.*

Distribution—Western Australia, South Australia, Victoria.

THE range of the Porphyry-crowned Lorikeet extends right across the extreme southern portions of the Australian continent. There are specimens in the Australian Museum Collection obtained by Mr. George Masters at King George's Sound, Western Australia, in April, 1886, and again at Mongup, Salt River, in January, 1869. Mr. Kendal Broadbent procured specimens at Port Augusta, and the late Mr. J. A. Thorpe brought a number to Sydney in the flesh he had collected at Mount Lofty, near Adelaide, in June 1888. It is of comparatively recent years that this Lorikeet made its appearance near Melbourne, Victoria. I first heard of specimens being obtained at Melton and Keilor in 1893, and Mr. G. A. Keartland procured specimens at Eltham. In the Western District of Victoria Dr. W. Macgillivray also sent me a note of its occurrence near Hamilton.

From Victoria Mr. G. A. Keartland wrote me as follows on the 5th May, 1904:—"I went for a drive to Eltham a few days ago, and took my gun. On passing a Yellow Box tree in blossom I noticed a number of birds in it, and for a time fired as fast as I could load, getting, among others, four species of Lorikeets. They were *Glossopsittacus porphyrocephalus*, *G. concinnus*, *G. pusillus* and *Lathamus discolor*. A few years ago the former species was quite unknown near Melbourne, but they are now regular visitors.

Mr. Edwin Ashby writes me from South Australia :—" *Glossopsittacus porphyrocephalus* were in great numbers at Blackwood in 1908, but they are here every year when the Peppermint Gums are in flower."

From the Reed-beds near Adelaide, on the 7th May, 1893, Mr. W. White wrote me as follows:—" At Mount Barker, on the 18th September, 1886, my son and I found a nesting-place of *Glossopsittacus porphyrocephalus* in the hollow limb of a Eucalypt, and after enlarging the narrow entrance to it with an axe, much to the annoyance and evident displeasure of the parent birds, discovered three young ones and an addled egg on the decaying wood at the bottom of the cavity. During the same month we were also successful in obtaining at Blakestown, near Mount Lofty, two fresh eggs from a partially grown over hole in a green limb of a large Gum tree. I am informed that in the Flinders Ranges these birds are irregular breeders, and young birds have been seen in the depth of winter."

Dr. W. A. Angove writes as follows from Tea-Tree Gully, South Australia :—" *Glossopsittacus porphyrocephalus* is very numerous at all times, and breeds fairly freely, but more so in the Murray Scrub and along the banks of the Murray River, in the hollows and spouts of the largest of the Gums. October is their proper nesting time."

From Western Australia Mr. Tom Carter writes me :—" *Glossopsittacus porphyrocephalus* simply swarmed in the vicinity of Broome Hill, South-western Australia, in the summer of 1906-7, feeding on the honey from the White Gum blossoms, which were in unusual profusion. Eggs were not taken, but apparently breeding was late, as many recently fledged birds were observed all through January. Flocks of this species fly at such a reckless speed that numbers are killed by flying against wires and netting fences. They are common about Kellerberin, in the east central district, and also about Albany and Denmark in the far south."

The eggs are four in number for a sitting, round or rounded-oval in form, white, the shell being close-grained, smooth and lustreless, and more or less stained with the decaying wood on which they are laid. One egg of the set of two fresh eggs taken by Mr. White at Blakeston, near Mount Lofty, in September, 1886, measures :—Length 0·83 × 0·86 inches. Another set of three taken by him in the same locality in November, 1893, measure :—Length (A) 0·85 × 0·7 inches; (B) 0·8 × 0·72 inches; (C) 0·8 × 0·66 inches.

Family CACATUIDÆ.

Sub-family CACATUINÆ.

Genus MICROGLOSSUS, *Geoffroy St. Hilaire.*

Microglossus aterrimus.

GREAT PALM COCKATOO.

Psittacus aterrimus, Gmel., Syst. Nat., tom. I., p. 330 (1788).

Microglossus aterrimus, Gould, Bds. Austr., fol. Vol. Suppl., pl. 61 (1869); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 103 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 9 (1900); Salvad., Ibis, 1906, p. 125.

Microglossum aterrimum, Gould, Handbk. Bds. Austr., Vol. II., p. 27 (1865).

ADULT MALE.—*Lores and forehead black; elongated crest plumes dark slaty-black; remainder of the plumage black with a greenish gloss, which is more pronounced on the feathers of the back;*

bill black : legs and feet black : "iris purplish-brown : cheeks pale dull crimson, bordered with pale yellow" (Gould). Total length .265 inches, wing 15, tail 11, bill 4, tarsus 1.15.

ADULT FEMALE—*The sexes are alike in plumage.*

Distribution. Cape York Peninsula, New Guinea, Aru Islands.

THE Great Palm Cockatoo is an inhabitant of the northern portion of the Cape York Peninsula, the Papuan and the Aru Islands. Although characterised by Gmelin in 1788, it was not added to the Australian Avi-fauna until H.M.S. "Rattle-snake" visited Cape York in 1847, when Macgillivray succeeded in obtaining specimens. In addition to its entirely sable plumage and elongated crest plumes, its bare cheeks and widely set apart powerful mandibles will enable one at a glance to easily recognise this species from any other of the Black Cockatoos found in Australia. There are specimens in the Australian Museum Collection obtained at Cape York by the late Mr. Alex. Morton and other collectors, and where this species was also procured by the Chevert Expedition in 1875; also specimens from Port Moresby, New Guinea, collected by Mr. Kendal Broadbent.

Mr. H. Greensill Barnard, of Bimbi, Duaringa, Queensland, writes me as follows:—"During my collecting trip on Cape York Peninsula in 1896, I observed several *Microglossus aterrimus*, but unfortunately I was not successful in obtaining their eggs. Although I found several nests, on my ascending the tree the birds always deserted them, the nests not being ready for eggs. They were in upright hollow spouts, from eighteen inches to two feet in depth, and at the bottom of the spout was a layer of green sticks about half an inch in diameter, and from two inches to three inches in length, with a depth of over four inches. The sticks in one instance were of scrub timber, and these must have been brought from over a quarter of a mile away. The birds bring these sticks in lengths of about twelve to fourteen inches, several of which were found in the holes partly bitten through."

Mr. G. A. Kearthland, of Victoria, who has rendered me much assistance both in specimens and notes, kindly sent me an egg of this species, together with the following note:—"I succeeded in getting another egg of the Great Palm Cockatoo, which I am sending you. It was obtained almost accidentally in the early part of March, 1898, on the Cape York Peninsula. Mr. Harry Wilson was travelling with stock, and as he rode on ahead to select a camp he disturbed a Great Palm Cockatoo from a high charred hollow stump. As there was plenty of good feed and water there, he selected it for his camping ground. When the cook arrived with the ration cart, he obtained an axe and soon made an opening in the side of the stump, and found the nesting-place, consisting of some twigs, about six feet from the ground, on which was lying the accompanying egg, and which he found, when blowing it, was partly incubated."

The egg referred to above is oval in form, fairly rough shelled, minutely pitted, and having a few small limy excrescences scattered over the surface; it is dull white and the shell slightly lustrous, and measures:—Length 2.15 × 1.58 inches. Another egg in Mr. Joseph Gabriel's collection, also obtained on the Cape York Peninsula, measures:—Length 2.07 × 1.52 inches. Another egg in Mr. Kearthland's collection, taken at the same place, measures:—Length 2.2 × 1.61 inches. The pittings on the surface of the shell of this specimen are so minute that they are not visible, unless examined with a lens.

Immature birds have a smaller bill, and the feathers of the lower breast and abdomen margined at the top, and crossed with three narrow pale greenish-yellow cross-bands. Wing 14 inches.

Genus **CALYPTORHYNCHUS**, *Vigors and Horsfield.***Calyptorhynchus funereus.**

YELLOW-TAILED BLACK COCKATOO.

Psittacus funereus, Shaw, Nat. Misc., pl. 186 (1789).

Calyptorhynchus funereus, Gould, Bds. Austr., fol. Vol. V., pl. 11 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 20 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 107 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 10 (1900); Salvad., Ibis, 1906, p. 126.

ADULT MALE.—*General colour above and below brownish-black, with paler margins to most of the feathers, those of the forehead and cheeks are a more decided black, and those of the lower breast and abdomen a clearer brown and having dull straw-yellow margins, as also have the under wing-coverts: ear-coverts straw-yellow: central pair of tail-feathers brownish-black, the remainder brownish-black crossed, except a narrow margin on the outer web, with a broad yellow band which is minutely freckled and spotted with brownish-black: bill greyish-black; legs and feet dull mealy-brown: iris brownish-black. Total length in the flesh 26 inches, wing 16, tail 1 1/4, bill 2, tarsus 1 1/4.*

ADULT FEMALE.—*Similar in plumage to the male, but as a rule the yellow bar on the tail-feathers is thickly covered with broken zig-zag lines of blackish-brown.*

Distribution.—Queensland, New South Wales, Victoria, South Australia, Kangaroo Island.



YELLOW-TAILED BLACK COCKATOO.

OF the Black Cockatoos inhabiting Australia, the present species is probably better known owing to its wide distribution and frequenting the more inhabited portions of the Eastern States. Its favourite haunts are the coastal districts and contiguous mountain ranges, and the adjacent open forest lands, its range extending from the neighbourhood of the Herbert River, in North-eastern Queensland, throughout Eastern New South Wales into Victoria, the eastern parts of South Australia and Kangaroo Island. I have met with it in many parts of Victoria, but more often in the mountainous country of Gippsland and around Ballarat and Creswick. It is the only species inhabiting the neighbourhood of Sydney, and it may be found all the year about the upper parts of Middle Harbour, venturing occasionally into the more cleared parts about Roseville and Lindfield and the suburbs farther north on the highlands of Milson's Point Railway Line. What is now known in Roseville Park as "The Glen," abutting on Middle Harbour, was one of their favourite haunts, but since it has been cleared of its undergrowth, and paths made through it, like the Lyre-bird this species is now seldom seen there.

Usually they are seen in pairs or small flocks of four or five individuals, but on the 28th August, 1900, I counted twenty as they flew over my house at Roseville, the largest number I have ever seen in this locality. On the 15th February, 1909, a flock of eight birds also flew over. They have a slow laboured flight, and when on the wing is the time they usually utter their somewhat

weak but harsh and discordant cries, which may, nevertheless be heard a long distance away. Their notes, when once heard, are not easily mistaken for any other species. These birds breed about Middle Harbour, for in August, 1908, I saw a pair attending to the wants of a young one. Usually they are shy and wary, and difficult of approach, but occasionally I have without any difficulty walked beneath the tree on which they were perched. This species I found more common on the Hawkesbury River and higher parts of the Blue Mountains; it may also be met with in the timbered portions of the National Park.

The foregoing description is taken from a fine old pair of birds, procured by Mr. J. A. Boyd at Moss Vale, New South Wales, in March, 1876. About the only variation I can find in the adult plumage of both sexes, collected in different localities, is in the under tail-coverts. Some specimens have these entirely bluish-black, others have the basal portion of the under tail-coverts often of one web only, centred with yellow, and which may be again mottled with brownish-black. Of abnormally plumaged individuals, there is a remarkable instance of xanthochroism in *Calyptorhynchus funereus* in the Exhibit Collection presented by Mr. G. M. Pitt, and obtained by him at Wiseman's Ferry, on the Hawkesbury River, New South Wales. This specimen differs from the typical form in having the upper and under surface, upper and under wing-coverts, scapulars, innermost secondaries, and under tail-coverts yellow, with which are intermingled a number of the usual brownish-black feathers, giving it a decidedly mottled appearance, and a strikingly contrasted plumage.

The food of this species consists principally of seeds of the *Banksia*, *Casuarina* and *Hakea*, and large white wood horny grubs found in living Eucalypts, which it strips and cuts away with its powerful bill, and more often when the grub has eaten its way into a sapling. Probably by tapping the bird detects the distance down the limb the grub has bored, for it is generally about eight inches below the hole where it has entered the branch that the bird commences to tear away the bark and bite away the wood in its search for the grub, and it may be another foot before it finally obtains it. In the Australian Museum Collection there is exhibited a portion of a Eucalyptus sapling showing the method employed by this species to obtain wood-boring larvæ. The sapling was almost severed by the bird's powerful mandibles, and a number of chips, some of them six inches in length by one and a quarter inch in breadth, and a quarter of an inch thick, were found at the base of the sapling. This was one of a number more or less similarly treated at Lawson, on the Blue Mountains, New South Wales. Prior to its receipt from Mr. E. G. W. Palmer, who exhibited it at a meeting of the Linnean Society of New South Wales, the President, the late Dr. James Norton, M.L.C., remarked that in his grounds at Springwood, on the Blue Mountains, the Black Cockatoos had succeeded in ring-barking some of the Manna Gums, one foot in diameter, in pursuit of boring grubs.

Relative to this species living in confinement, Mr. A. A. Brett, of Kogarah, near Sydney, brought me a specimen for examination that had died on the 25th December, 1907. He informed me it was taken precisely to date two years before, by his son, from a nesting-place in a Belar tree (*Casuarina*, sp.) near Cunnamulla, in South-western Queensland, and that while he had it in confinement it was very tame and affectionate, and could distinctly say "halloo" and other monosyllabic expressions. A fully adult live bird brought to me for identification, I afterwards heard was taken by its owner to Europe, and arrived alive and well.

The following information I received at various times from the late Mr. George Barnard, of Coomooloolaroo, Duaringa, Dawson River, Queensland:—"On the 2nd June, 1884, my sons found a nest of *Calyptorhynchus funereus*, containing two eggs. The nesting-place was in the hollow bough of a tall Eucalyptus. About this time last year we got a young bird, which is still alive and very tame. On the 8th June, 1890, they found another; unfortunately the eggs were just hatching, one young one just out, and one egg chipped; though we knew they bred in June, we did not think they would be so early. On the 12th June, 1891, my sons found

two nests of *Calyptorhynchus* and two of *C. solandri*, about ten miles from the homestead. Each nest contained but a single egg, all of which were perfectly fresh, but as the holes in the trees had all been enlarged by chopping, and they were far from home, the eggs were taken. All the nests were within a mile of each other, and were in the hollow boughs of lofty Eucalypts. The *C. funereus* nests were from thirty to forty feet from the ground, and deep down in the hollow trunks of trees; those of *C. solandri* were from seventy to ninety feet from the ground, and the eggs could almost be reached from the entrance. A fortnight after my sons went out again, but only one nest was found to be re-occupied, that of *C. funereus*, which contained two eggs."



ORARA RIVER ABORIGINAL CLIMBING TREE.

Mr. H. G. Barnard, of Bimbi, Duaringa, Queensland, writes me as follows:—" *Calyptorhynchus funereus* breeds in this district during May and June. The site generally selected is a hollow in a Gum tree (Eucalyptus), either Swamp or Lemon-scented, but I have also found them in dead trees. When they have selected a suitable hollow the birds, with their powerful bills, chip all the decayed wood from the inside of the hollow, letting it fall to the bottom, where it forms a thick and soft resting place for the eggs, keeping them off the damp wood, which is generally to be found in hollows at that season of the year. The eggs, two in number for a sitting, are deposited at the bottom of the hole, from two to six feet from the entrance. Though the birds hatch both eggs, I have never seen a pair of the young reared, one always seems to die. In 1882, when a boy, I climbed a very large Swamp Gum for a Funereal Cockatoo's nest, and found two young in it just hatched. Wishing to rear the young I left them, and returned some weeks later to find only one bird alive, the remains of the other being in the hole. I secured the one remaining, and successfully reared it on bread and milk and chopped fresh meat; it would not eat seed of any kind. I was offered five pounds for the bird as soon as it would feed itself, but this it refused to do; it would willingly take food from my hand, but would not attempt to feed itself, and when nearly twelve months old a native cat got into the cage and ended its career. The food of these birds consists of large white grubs. I found a nest of *Calyptorhynchus funereus* on the 31st May, 1893, in a tall Eucalyptus, and about forty feet from the ground, the nesting-place and the distance from the entrance to where the egg was deposited being eight feet. As I had chopped into the tree, and was also leaving home next day for a fortnight, I was reluctantly compelled to take the single egg found in the nesting-place."

From Copmanhurst, Upper Clarence River, New South Wales, Mr. George Savidge writes me:—" *Calyptorhynchus funereus* is nowhere numerous here. It may be seen in twos or threes, and before the breeding season in small flocks of four or five. A set of two eggs was found by me on the 21st March, 1897. They were deposited in the main branch of a tall Eucalyptus

close to a road, where there was a good deal of traffic. This bird, like other members of the genus, has a very powerful bill, its foods consisting of nectar, oak nuts, and grubs, the latter of which it obtains by biting away the trees. The same month and year I was shown another nesting-place of *C. funereus*. On climbing to it I found it contained one egg, and as I thought that only one was laid for a sitting, I shot both birds to make certain of the species, and found another perfect egg in the female, so was very fortunate to obtain the full set. I am sending you down the skins for identification. The nesting-place had a slight lining of Gum leaves. In 1908, when accompanied by my sable companion "Cobby," he drew my attention to a large sapling these birds had eaten through about six feet from the ground, it was quite as thick as a man's leg, and seemed an incredible task for any bird to perform."

The accompanying figure, reproduced from a photograph taken by Mr. Savidge, represents "Henry," an Orara River Aboriginal, climbing a tree with the aid of a tomahawk and vine. Natives, as a rule, do not chop unnecessary steps when climbing; note the immense stretch of leg required to insert a toe in each notch. "Henry" was one of three aboriginals who assisted Mr. Savidge in procuring a portion of the eggs for his collection. "Fred" and "Cobby," the others, were of equal assistance.

Mr. A. E. Holden kindly gave me the following notes when presenting a specimen to the Trustees of the Australian Museum:—"For as long as I can remember a flock of Black Cockatoos (*Calyptorhynchus funereus*) have lived in the remoter gullies at the back of Middle Harbour. At one time they numbered sixteen or seventeen, now their numbers are reduced to four or five. A few years ago we built a camping house of galvanised iron in French's Forest, at the extreme head of Bantry Bay north-eastern arm, and painted the roof red with oxide paint. At this time the flock was roosting in a gully below the house, and their habit was to move out at the grey dawn and wait for the sun amongst the trees in the hill on which our camp was built. They must have become familiarised with the hut, for very soon they began to disturb our slumbers by flitting on to the ridge capping. The noise they made increased, and was not explainable, until one morning on stealing outside silently I caught them picking at the red oxide, and apparently devouring small flakes as they bit it off with their powerful beaks. Bush fires cleared out their coverts eventually, and they moved to more secure fastnesses. On another occasion I was Gill-bird shooting in some Red Honeysuckle Scrub, with a friend, when a pair of these birds moved suddenly out of a bush. An involuntary "double" brought them down. On picking them up quantities of nectar poured out of their throats, precisely as happens with any honey-eating bird, and as the nectar was of the Banksia flower they would seem to be most ingenuous feeders, as their huge mouths do not seem at all suitable for the operation of honey extraction. In the Southern Alps these birds are said to be harbingers of blizzards and storms when seen in any sheltered gully in the day time, and many a miner has 'broken camp' at the sight of them, especially in the months of March or April. On the 1st August, 1907, three sat in a low bush (whilst a gale and rain was at its height) just off the French's Forest Road, and made most dismal cries. They would not move at my approach, and not until I had almost put my hand on them did they flit heavily a few yards away."

Mr. Percy Peir, a well known aviculturist of Marrickville, Sydney, New South Wales, and a frequent and successful exhibitor at our local bird shows, also at the Crystal Palace Exhibition, London, writes:—"At the end of July, 1908, I saw altogether four pairs of *Calyptorhynchus funereus* on the ridge behind Deep Creek, at Narrabeen. The pairs were separated and not shy, allowing us to approach closely, when several of the birds could be seen nipping off the thin branches in proximity to them, and the while uttering a rather wheezy cry. Several pairs were also seen later on in the season at Tumbledown, Narrabeen, which were flushed from the ground where they had been grubbing."

From Belltrees, Scone, New South Wales, Mr. H. L. White sends me the following note :—
 “*Calyptorhynchus funereus* is often seen in the high country, and it is a recognized sign of rain when they fly about in the open lower forest. Their well known habit of stripping the bark from newly ring-barked trees, has been frequently observed here. One nest has only been noted, it was in an inaccessible position in a tall dead Stringy-bark tree; the young left the nest early in January, previous to which they had been fed by the parent birds apparently late in the afternoon only.”

The late Mr. James D. Cox wrote me as follows from Bell, Mount Wilson, on the Blue Mountains, New South Wales, on the 26th December, 1895:—“An unknown incident happened, as far as my knowledge goes, in early spring this year. Flocks of hundreds, or perhaps thousands, of the Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*) flew low down over the mountains, heading north. Occasionally some of the flocks would alight for rest, and blacken the trees with their vast numbers, and their united cries made a deafening noise. Previously I had never seen more than about fifty or sixty in one flock. As you know, it has been a remarkably dry season.”

Mr. G. A. Keartland sends me the following note from Melbourne, Victoria:—“Whilst Gippsland is the stronghold of the Funereal Cockatoo, it is also to be seen in other places near the south and eastern coasts. I have the skin of a fine female shot from a flock of eight within a mile of Portarlington. In the Dandenong Ranges they frequent the dead timber, and tear off large pieces of bark in order to secure the large white grubs, of which they are very fond. They live fairly well in captivity if fed on Sunflower seed. I never saw them on the ground.”

While resident at Hamilton, in Western Victoria, Dr. W. Macgillivray sent me the following notes:—“*Calyptorhynchus funereus* is found all over the Hamilton district; a favorite food seems to be the green Sheoak cones, which are cut into bits by this bird for the seeds contained in them; they also feed on the larva of some insect found under the bark and in the soft decayed wood of dead wattle trees. They nest late in the year, usually about the last week in December, or early in January, and choose a hollow in a tall Red Gum for the purpose, and are often noticed frequenting the tree, and going in and out of the hollow, for a month before laying, the same place being often resorted to year after year if unmolested. Two eggs are usually laid and sometimes three, but rarely more than one young one reared. The young when hatched are covered with yellow down, and take a long time to become sufficiently feathered to leave the nest. The birds are in the habit of chipping off the bark round the mouth of the nesting hollow, which renders it rather conspicuous. When drinking they usually alight a yard or two from the water, and walk down to it, one being always left on guard.”

Mr. Edwin Ashby writes me from South Australia: “*Calyptorhynchus funereus* was nesting in the Forest Range in 1886, and pairs are usually seen flying over Mount Lofty and Aldgate, but I have seen large flocks at Square Waterhole and at Normanville; in the latter place they were feeding on the Native Honeysuckle (*Banksia marginata*). This species is very common in the large timber in the north-western portion of Kangaroo Island, where it breeds. At Cape Otway, in Victoria, I have seen it in flocks of twenty or more.”

Dr. W. A. Angove sends me the following note from Tea-tree Gully, South Australia:—
 “*Calyptorhynchus funereus* visits us most years, but in decreasing numbers. The birds come to the Honeysuckle when in flower in pairs or in small flocks of three or four. This species nested yearly in Forest Range, at Fox's Creek, very high in the largest of the Stringy-bark, but has not done so of late years to my knowledge.”

The nesting-place is in the hollow trunk, sometimes in a large hollow bough of a tree, and generally in a Eucalyptus, at a height of about thirty to sixty or seventy feet from the ground.

The eggs are two in number for a sitting, and vary from a very rounded oval to a thick oval, tapering somewhat sharply towards the smaller end, the shell being very finely granulate, and having minute shallow pittings all over them. They are dull white, and usually nest-stained with the decaying wood on which they are laid; some specimens are almost lustreless, others are slightly glossy. Undoubtedly the rounded oval, with only a slight lustre, is the type more often found. A set of two taken by Mr. H. G. Barnard, at Duaringa, Queensland, on the 13th June, 1893, measures:—Length (A) 1.82 × 1.49 inches; (B) 1.9 × 1.6 inches. A set of two taken on the 11th June, 1893, measures:—Length (A) 1.9 × 1.42 inches; (B) 1.91 × 1.42 inches. An incomplete set of one was also received from Mr. Barnard, taken on the 1st June, and a full set of two taken on the 9th July, 1893.

A nestling in the Australian Museum Collection, presented by Mr. A. Cape in February, 1881, and taken from a nesting-place in a hollow trunk of a tree at Burrawang, near Moss Vale, New South Wales, and apparently about a month old, is black above, brownish-black below, with long narrow straw-yellow streamers of filamentous down here and there over the upper parts and flanks, and thickly disposed on the hind-neck and rump, the duller coloured feathers of the under parts being narrowly fringed with straw-yellow; ear-coverts dull wax-yellow; periorbital region bare, as is also the abdomen and inner portion of the thighs, with the exception of a few scattered pin feathers. Wing 3.6 inches.

Immature birds have the yellow patch on the ear-coverts smaller than in the adults.

The breeding season is variable, as will be seen from the preceding notes. Mr. Savidge obtained eggs in New South Wales in March, and the nestling referred to above was taken in February. In the south-eastern parts of the Central District of Queensland Mr. H. G. Barnard found it breeding in May, June and July, young birds being found early in June. In South-western Queensland Mr. Brett obtained a young one from a nesting-place on the 26th December. In the Western District of Victoria Dr. W. Macgillivray records it breeding in the last week of December or early in January.

There are only three Tasmanian skins in the Australian Museum Collection, two of which were obtained by Mr. George Masters at the Ouse River in March, 1867, and another at Lachlan Vale, during the same month. Whether *Calyptorhynchus xanthonotus*, Gould, is a distinct species from the continental form, *C. funereus*, I am unable to tell from the small number of Tasmanian examples. In addition to the slightly smaller size of the latter, they may be distinguished by the broader dull yellow margins to the feathers of the under parts, and to the under-wing coverts and tips of the under-tail coverts. The yellow band on the tail-feather is also comparatively narrower than in Australian specimens. Total length of skin 24 inches, wing 15 inches.

From Penguin, Tasmania, Mr. R. N. Atkinson writes me:—" *Calyptorhynchus xanthonotus* occurs throughout Tasmania and some of the larger islands of Bass Strait. I have often seen flocks tearing off pieces of wood, chiefly from Sassafras-trees, containing the larvae of Coleoptera, their principal food. When travelling long distances they usually fly at a great height from the ground."

Mr. Malcolm Harrison writes me from Glenorchy, Tasmania:—" *Calyptorhynchus xanthonotus* is much more generally distributed throughout Tasmania than the White Cockatoo. Parties of from three or four to seven or eight are more commonly seen, and their advent to the lower country is generally in advance of rough weather. They still frequent the country around Mount Wellington

as in Gould's time, and on the 1st January, 1896, I watched for some time a small flock busy on the Banksia cones in the neighbourhood of Glenorchy. The eggs were for many years among the desiderata of my cabinet, until in 1896 Mr. Leslie Burbury succeeded in obtaining a set for me in the Oaklands District in the Midlands. A shepherd on the estate chanced to see the bird fly from a hole in a tall Eucalyptus, and informed Mr. Burbury, who, after putting the bird from the nest several times, took the two eggs on the 23rd January, 1896. He describes them as being found in a slight hollow on the decayed wood about thirty inches below the hole in the main trunk of the tree, and between forty and fifty feet from the ground. A few dried gum leaves were present, but these might have been accidental. The eggs were slightly incubated. The locality strange to say was not by any means an unfrequented one. Mr. Burbury continued to keep a look out, and on the 2nd January of the following year (1897) secured another pair of eggs for me, the data in connection with them being very similar to the first. From the dates given, and from the fact that I can find no record of the bird nesting before the end of December, it would appear that nesting operations are very late in comparison with those of Tasmanian birds in general."

Two eggs in Mr. Malcolm Harrison's collection, taken on the 23rd January, 1896, at York Plains, near Oaklands, from a nesting-place in a Gum tree forty feet from the ground by Mr. Leslie Burbury, are rounded oval in form, dull white, the shell slightly pitted, and one specimen having a faint lustre. They measure: Length (A) 1.82 × 1.47 inches; (B) 1.73 × 1.44 inches. There are also two eggs in the Tasmanian Museum, Hobart, taken on the 25th January, 1897. The following information is extracted from a note by the late Mr. Alexander Morton, the Curator:—"Taken on the top of the Western Tier, near Tunbridge. The nesting-place was four feet down the barrel of a Stringy-bark, and about fifty feet from the ground. The bird was seen to leave the nest, and both were seen about it. The eggs were received unblown on the 13th April following, and in one was found a fairly developed young bird; the other egg was added."

Calyptorhynchus banksi.

BANK'S BLACK COCKATOO.

Psittacus banksii, Lath., Ind. Orn., p. 107 (1790).

Calyptorhynchus banksii, Gould, Bds. Austr., fol. Vol. V., pl. 7 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 13 (1865).

Calyptorhynchus banksi, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 109 (1891); North, Vict. Nat., Vol. XIII., pp. 136-137 (1895); Sharpe, Handl. Bds., Vol. II., p. 10 (1900); Salvad., Ibis, 1906, p. 126.

ADULT MALE—Above and below black with a greenish gloss, which is more distinct on the upper parts: all but the central pair of tail-feathers and the outer webs of the outermost feather on either side crossed with a band of rich vermilion; bill dark greyish-black; legs and feet nearly greyish-black; iris black. Total length in the flesh 26 inches, wing 17, tail 13.5, bill 2, tarsus 0.9.

ADULT FEMALE—Above black, with a slight greenish gloss, the feathers of the head spotted with yellow, and those of the wing-coverts slightly tipped with yellow; central pair of tail-feathers black, the next pair black, crossed in the centre with dull red irregular wavy zig-zag bars, the remainder black, crossed in the centre with a red band, which is again mottled or irregularly barred with black, the basal portion of the inner web yellow, as is also a narrow edging on the outer web of the penultimate feathers; under surface of the tail of a much duller yellow and red than it is on the upper parts; fore-neck black, passing into brownish-black on the remainder of the under surface, where the feathers

are barred with dull yellow, except on the abdomen, where the barings are a mixture of yellow and red: under tail-coverts black and barred similarly to the abdomen: under wing-coverts black, broadly margined at the tips with yellow. Total length 21 inches, wing 18, tail 11.

Distribution—Queensland, New South Wales, Victoria, South Australia,

IN describing the genus *Calyptorhynchus* in the Transactions of the Linnean Society of London,* Messrs. Vigors and Horsfield quoted the following note:—"The native name of these birds," says Mr. Caley, "is *Geringora*. I have met with them in various parts of the country. In the north rocks, a few miles to the northward of Parramatta, I have frequently seen them, but never many together. The natives tell me it breeds in the winter in 'Mun'ning-trees,' or *Blood-trees* of the colonists (a species of *Eucalyptus*). It makes no other nest than that of the vegetable mould formed by the decay of the tree."

Parramatta is fifteen miles from Sydney, but like *Scythrops nova-hollandiæ*, *Dromaius nova-hollandiæ*, and many other species once common in the early days of settlement, the place knows them no more.

The typical *Calyptorhynchus banksi* is an inhabitant of the coastal brushes and contiguous mountain ranges of Southern Queensland and Eastern New South Wales, where the type was obtained. It is the largest of all the Red-tailed Black Cockatoos, although I regard *Calyptorhynchus stellatus*, Wagler, and *C. macrorhynchus*, Gould, only as geographical variations of *C. banksi*, and not as distinct species, all gradually merging into one another. *C. banksi* is also an inhabitant of the western portions of Southern Queensland and New South Wales, its range extending into the adjoining portions of South Australia, but I have never heard of its occurrence in the south-eastern portions of the latter State. Specimens from the north-eastern parts of Queensland, about Cairns and the Bellender Ker Range, are smaller than examples obtained in Southern Queensland and New South Wales, and approach the western form, *C. stellatus*, but from which the adult females may be chiefly distinguished by the larger amount of red on the tail feathers, although this is by no means a constant character, as a specimen in the Australian Museum Collection from Western Australia has as much red on the tail feathers as eastern examples. The measurement of an adult female from Cairns is 15.7 inches.

I have met with the present species in Victoria, the southern limit of its range, but have no specimen for comparison from that State. On the Clarence River, New South Wales, where Mr. G. Savidge has found it breeding, I observed it in November, in small flocks of usually three in number, frequenting the larger Eucalyptus growing on the river banks. These birds were apparently by their cries an adult pair with a young one. One of these flocks, that used to haunt the Gum trees near a cave-shelter overlooking the river, about a mile below Mr. Savidge's house, was remarkably tame, and on several occasions I could easily have shot all of them if I had so desired.

Some adult males have the red bar on the tail feathers bordered above with a narrow line of yellow, which colour in some specimens is continued in a triangular-shaped patch along the inner web. One adult male in the Australian Museum Collection has a large concealed oval red spot on one of the larger upper tail-coverts; another has a small red spot on both webs of one of the larger under tail-coverts.

Mr. Robert Grant has given me the following notes:—"While collecting around Boar Pocket, on the Bellenden Ker Range, North-eastern Queensland, in October, 1888, on behalf of the Trustees of the Australian Museum, *Calyptorhynchus banksi* was very common. Its favourite feeding trees were the Casuarinas and Eucalypts, more especially the Bloodwoods, and another large tree with small glossy dark green leaves and clusters of small bell-like blossoms. In one

* Trans. Linn. Soc., Vol. XV., p. 209-71.

of the latter trees, on one occasion, there must have been thirty or forty of them feeding at one time, and I shot sixteen of them without moving from the tree. They kept coming and going all day long, and did not seem to take much notice of the report of the gun, or of their companions

falling dead or wounded out of the tree, and I could have shot all without any trouble, but they were moulting and not fit for specimens. Those I obtained were required for the pot, and their flesh is delicious, and I much prefer it to either *Talegallus* or *Megapodius*. The contents of the crops of all I skinned consisted of seeds, berries and caterpillars. Their brightly coloured tail feathers are much prized by the Aborigines. Those that were with me took one of the red ones from the male, and alternately a red and yellow barred one from a female, until they had made a plaited head-band of about eight feathers, and then wore this as a head dress."

Mr. George Savidge sends me the following notes from Copmanhurst, Clarence River, New South Wales:— "*Calyptorhynchus banksi* is very sparingly dispersed throughout the Clarence River District. I have usually met with it in twos or threes and small flocks, but during the winter of 1908 I counted one flock containing about twenty-five or thirty birds. They were feeding on some Eucalyptus in flower, biting large pieces of the branches off with their powerful bills, the ground being strewn with them, and it reminded me of a great storm, when trees are dashed about in all directions. I watched them upon several occasions, and satisfied myself they were not breeding; they seemed cautious and shy, and would have been difficult to shoot. Upon one occasion only have we been able to procure the egg; it was on the 13th May, 1900, the nesting-place being in the main branch of a large dead Eucalyptus, about seventy feet from the ground, and my son Clarence climbed the tree with the aid of a rope ladder. He



DEAD TREE TRUNK USED AS A NESTING-PLACE BY BANK'S
BLACK COCKATOO.

had some difficulty in getting at the egg, as it was about four feet down a hole in the tree, and he could not reach it; the egg rested on a few green Gum leaves. Searching round a neighbour's fence I found a piece of wire, and with a handkerchief a scoop was made and the egg brought

safely down. It was a most difficult nest to reach. Not being sure of the species, the female was shot at as it left the nest, and although hard hit we could not find it, so I decided to await the home coming of the male bird. We heard him calling just at sundown, each call getting closer and closer till he lit on the top of a large tree, close by the nest. Evidently he knew something was wrong, as the hen bird had not left the nest; however, I managed to shoot this one, which I sent to you for identification. The female leaves the nest night and morning, and is fed by the male bird the same as pigeons feed their young, by crossing beaks and ejecting the food from the crop." The accompanying figure is reproduced from a photograph taken by Mr. Savidge. The entrance to the nesting-place was at the junction of the first main fork. It is exactly two inches from the top of the tinted background.

Mr. H. L. White sends me the following note from Belltrees, Scone, New South Wales:—" *Calyptorhynchus banksi* is rather more numerous than *C. funereus*, and occupies the same class of country. The birds appear to be very fond of the seed of the Casuarina, which grows plentifully on the hills about here. I have not seen or heard of a nest in this district, but have noted young birds almost every year."

The late Mr. K. H. Bennett wrote:—"With the exception of a pair of *Calyptorhynchus banksi* that I saw on the Lower Murrumbidgee River, I have never met with this species anywhere but in the vicinity of the Darling River. In the latter locality it was extremely numerous, associating in flocks of several hundreds and feeding on the seeds of a small Salsolaceous plant growing plentifully on the flats subject to inundation along the banks of the river. It was extremely plentiful in the neighbourhood of Wilcannia. On two occasions in July, 1862, I found nesting places on the Darling River. They were in the hollow trunks of large Gum trees, on the bank of the river, and each contained a single young one about half fledged."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray sends me the following notes:—"Banks' Black Cockatoo is found along the Darling River and its tributaries from Menindie upwards, but does not come into this back country. Mr. Nigel Kennedy of White Cliffs told me he counted as many as fifty in a flock on the Paroo River, in 1886, as they passed over his camp one evening."

Mr. Joseph Gabriel and Mr. G. A. Keartland both kindly permitted me to describe an egg of this species in their collections. Both were received by the former from Mr. W. H. Watson, and were taken by him from different nesting-places in Western Queensland. He supplied the following information under date 28th July, 1895:—"I have forgotten the precise date of taking the eggs of the Black Cockatoo, but I think I got one in the first week of May, and the other in the first week of June. Both nesting-places were in holes in big Gum trees overhanging a river, and were so situated that a stone dropped from them would fall into deep water. I was in a boat on both occasions, and the passengers who were with me also saw the Black Cockatoos fly out of the hollow limbs. At one time I used to manage Cultowa Station, on the Darling River, and there I saw dozens of the nests of these birds; generally they were in very big trees on the river banks. Altogether I have climbed to about twelve nests in New South Wales and Queensland, and have only found one egg or one young in each. I once watched a nest on the Darling River, and took the young one, which was successfully reared by Mr. John Hearn. It was a nice quiet bird, but when full grown got accidentally drowned."

One of the above eggs is elongate-oval, the other a slightly swollen-oval, the shell being rather coarse grained and minutely pitted, dull white and lustreless, one specimen having fine crack-like fissures in the shell. They measure:—Length (A) 2·1 × 1·38 inches; (B) 1·97 × 1·47 inches. Another specimen, with a few limy excrescences, subsequently received by me from Mr. Gabriel, and taken on the 24th June, 1898, measures:—Length 2·03 × 1·38 inches. Mr. Savidge kindly brought me for examination the egg he had taken on the Upper Clarence River

on the 13th May, 1900; also the skin of the male for identification. This egg is oval in form, pure white, dull and lustreless; the shell, although fairly close-grained, has numerous fine pittings, as if made with the point of a pin, and has two small and one medium-sized limy excrescences on the larger end. It measures:—Length 2·12 × 1·53 inches.

From the preceding notes it will be seen that the breeding season of Banks' Black Cockatoo in New South Wales extends over May, June and July, and probably it is the latter end of August, or early in September, before some of the young of the late breeders leave the nesting-place.

Calyptorhynchus stellatus is a slightly smaller South-western and Central Australian form of *C. banksi*; the more rounded forms of the crest referred to by Gould are not apparent in the Australian Museum series of adult males from Western Australia. An adult male from Central Australia has the red band on the tail feathers mingled with yellow, and these are crossed by several narrow irregular black bands. Adult females from Western Australia may be chiefly distinguished by the larger amount of yellow in the tail feathers; again, this is not a constant character, for I have seen a specimen from the south-west with as much red on the tail-feathers as examples from the Bellender Ker Range, North-eastern Queensland. Wing of adult male from Western Australia 16 inches; of adult female 15·2 inches.

Mr. Edwin Ashby wrote me:—"I saw large flocks of *Calyptorhynchus stellatus* at Kojonup, Western Australia, in May, 1880. They frequent the somewhat open country with scattered Acacias and Eucalyptus trees."

From Broome Hill, in the south-western portion of Western Australia, Mr. Tom Carter sent the following note:—"Western Black Cockatoos (*Calyptorhynchus stellatus*) were numerous in the south-western portion of this State twenty years ago, but have now either much decreased in numbers or retired before civilization. At that time they were abundant about the Vasse River, where they are now seldom seen. The greatest numbers I have seen in late years were on Blackwood River, in 1904, and on the coast near the Margaret River. If a bird is shot from a flock, the others will hover around it, making a great outcry and affording an easy target, otherwise they are difficult to approach."

While resident at Illamurta, Central Australia, Mr. C. Ernest Cowle wrote me as follows:—" *Calyptorhynchus stellatus* lays on the decaying wood inside the hollow branch of high Gum trees, either green or dry, and the nesting-places are frequently noticeable from the habit of the birds, gnawing or biting off the wood around the hole. Generally it lays two eggs, but I have had three brought me, which the blacks said came out of one nest. These birds frequently lay in the same nest their eggs have been taken from. They lay usually in March and April and up to the end of May, and remain with us throughout the year.

Two eggs of this form taken from the hollow spout of a tree on the 12th March, 1895, are pure white, oval in form, the surface of the shell, although smooth, being minutely pitted and lustreless. They measure:—Length (A) 1·93 × 1·48 inches; (B) 2·04 × 1·47 inches. A single egg taken by Mr. Cowle, at Illamurta, on the 12th March, 1894, differs from the above in having the surface lustrous. It measures:—Length 2·02 × 1·46 inches. Another taken on the 10th March, 1895, in the same locality, measures:—Length 2·02 × 1·44 inches. Although only one egg was found in each of these nesting places, both were incubated.

From Melbourne, Victoria, Mr. G. A. Keartland sends me the following note:—"In Central Australia *Calyptorhynchus stellatus* may be seen in immense flocks feeding on all kinds of seeds, which they find on the ground. The farthest south they reach is Goyder's Well, on the Finke River, north of Charlotte Waters, but their range extends for about six hundred miles north of

that point. They breed in the large timber along the course of the Finke, Hugh and Todd Rivers. I am indebted to Mr. C. E. Cowie for a number of their eggs taken in the localities indicated. Two eggs constitute the usual clutch, but sometimes only one is laid. They vary considerably in size, shape and texture of shell. Whilst some are smooth, others are rough with a number of limy excrescences on the shell. These birds live well in captivity if fed on maize."

Calyptorhynchus macrorhynchus is a Northern and North-western Australian form of *C. banksi*. Typically, as its name implies, it may be distinguished chiefly by its larger bill. In February, 1909, I examined a fine old adult male in the possession of Mr. F. Kruger, who had procured it some time before from the neighbourhood of Pine Creek, in the Northern Territory of South Australia. It had been about eighteen months in confinement, and was, when he first received it, feeding on maize, wheat and water-melon seeds. Gradually Mr. Kruger changed the diet, and when I saw him he was contentedly feeding entirely on canary seed, picking up one seed at a time, and carefully husking it before eating the grain. Although it had been so long in captivity, it would not allow anyone to handle it, and an attempt by its owner to turn it round with his hand resulted in the bird biting him. During the whole of the time I saw it, on two occasions, it remained on the perch at the back of the cage, with the head thrown back and wide spread mandibles. A skin of an adult male in the Australian Museum Collection, received in the flesh from the Council of the New South Wales Zoological Society, Moore Park, and obtained on the Nicholson River, an affluent of the Gregory River, which takes its rise in the eastern portion of the Northern Territory of South Australia, and flows into the Gulf of Carpentaria, in Northern Queensland, is precisely similar in plumage to specimens procured in New South Wales, except that the bill, especially the lower mandible, instead of being larger, is smaller and narrower than that of southern examples. While typically the bills of specimens from the Northern Territory and North-western Australia are larger, there is proof that it is by no means a constant character. When one has to ask the locality of a specimen, before supplying a name, it is time that all these forms should be united under that of the first described species, *Calyptorhynchus banksi*, which is also the type of the genus. In addition, too, intermediate stages of plumage are found between these described forms, as well as variations, even when obtained in the same locality. I freely acknowledge, however, that one can occasionally pick specimens from South-western Australia, and Northern and North-western Australia, agreeing with both of these described forms, *Calyptorhynchus stellatus* and *C. macrorhynchus*. Gould, in separating the latter, compared it with *C. cooki* (= *C. viridis*, Vieillot) instead of its closer ally *C. banksi*.

Mr. G. A. Kwartland has sent me the following note:— "*Calyptorhynchus macrorhynchus* is confined to the northern portion of Australia. It is usually found in pairs, or in small companies, presumably parents and young, but about a month after the young ones leave the nest they congregate in flocks of from twenty to thirty. These birds are fond of the small black native fig, but their principal food is the bulb of a species of water lily, which they find on the margin or in the bed of dried up swamps. After searching for the bulbs they generally walk to the water for a drink before taking flight. Nestlings are evenly sprinkled with small white spots."

Mr. Percy Peir, of Marrickville, Sydney, sends me the following notes:— "A female *Calyptorhynchus macrorhynchus* was received from a friend in Port Darwin, which he had reared up to the picking stage on oatmeal and boiled wheat. Whilst in my possession it thrived on Sunflower and Canary seed, also corn, which it cracked up to a fine powder. It was a very destructive bird, as on one occasion, when placed in the bathroom during the absence of the household, it was found on our return that the bird had stripped the wood flashing of

the bath into splinters with its powerful bill. Unfortunately it died when just beginning to talk. A young bird may often be purchased from local Chinese storekeepers, who seem to fancy this Cockatoo as a pet. Mr. Pitford, a resident of Port Darwin, states that during March and July, 1900, about ten miles out of Pine Creek Railway Terminus, he saw small flocks of eight to twelve birds settling down to a waterhole, and as each flock arrived they amalgamated, forming one great mass of birds, the sky being literally black with them. They would swoop down to quench their thirst by scooping up the water while on the wing, and then settling down in the Quandong trees which grew in the vicinity of the waterhole, would pick the fruit, devouring the pulp and rejecting the hard stones. These large flights occurred at daybreak and dusk, and, when replenished, the great mass would rise in a body, divide up into small parties, and disappear for the rest of the day. On one dead tree near by fully a hundred birds were counted, and their harsh grating cry was simply deafening."

From Mr. Chas. French, Junr., Assistant Government Entomologist of Victoria, I received the tail of a female obtained at the same time as a set of two eggs which were taken from a nesting-place in a hollow tree near the Daly River, in the Northern Territory of South Australia, on the 27th June, 1902. These eggs are long oval in shape, the shell being coarse-grained, slightly pitted and dull white. They measure:—Length 2.08 × 1.38 inches. Another egg from a set of two taken on the 13th July, 1902, measures:—Length 1.88 × 1.3 inches.

Calyptorhynchus viridis.

LEACH'S BLACK COCKATOO.

Cacatua viridis, Vieill., Nouv. Dict. d'Hist., tom. XVII., p. 13 (1817).

Calyptorhynchus leachii, Gould, Bds. Austr., fol. Vol. V., pl. 10 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 18 (1865).

Calyptorhynchus viridis, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 112 (1891); Sharpe, Handl. Bds., Vol. II., p. 10 (1900).

ADULT MALE.—*Head brown; back, wings and tail black, glossed with green, all but the central pair of tail feathers crossed in the middle with a vermilion band, except on the margin of the outer webs; all the under surface dark brown, the lower sides of the body and the under tail-coverts nearly black, and having a slight greenish gloss; bill greyish-black; legs and feet dark mealy-grey; iris dark brown. Total length in the flesh 20.5 inches, wing 13.5, tail 10, bill 1.8, tarsus 0.75.*

ADULT FEMALE.—*Similar in plumage to the male, but having the vermilion portion of the tail-feathers crossed with black bands and margined with yellow along the edge of their inner webs; the under surface of the tail-feathers shows more yellow than on the upper surface, and particularly on the outermost feather on either side.*

Distribution.—Queensland, New South Wales, Victoria, South Australia, Kangaroo Island.

LEACH'S Black Cockatoo is the smallest species of the genus, and in favourable situations is distributed throughout South-eastern Queensland, Eastern and Central New South Wales, Victoria, the eastern portions of South Australia, and is likewise found on Kangaroo Island. The coastal and contiguous mountain ranges, and open forest lands are its usual haunts. There are numerous specimens in the Australian Museum Collection, some of them procured by Mr. Geo. Masters at Pine Mountain and the Burnett River, in South-eastern Queensland, some from the Richmond River and the Bellenger River, the latter obtained by Mr. Robt. Grant, and some from Moss Vale procured by the late Mr. J. A. Thorpe. The latter informed me that this species used to frequent the neighbourhood of Botany and Kurnell. It is not found so close to Sydney as *Calyptorhynchus funereus*, but occurs twenty or thirty miles away at Port Hacking, National

Park and Picton. It is common in the heavily timbered ranges of the Illawarra District and on the Blue Mountains, and the open forest lands further inland. At Wambangalang Station, about twenty miles from Dubbo, and about two hundred and ninety miles west of Sydney, Mr. E. H. Lane found it breeding on many occasions during his long residence there. In March, 1891, he forwarded me, with the eggs of this species, an adult female in the flesh shot near a nesting-place in a hollow trunk of a dead Box-tree. Farther north in New South Wales, I observed it in the Upper Clarence District in November, 1898, where Mr. G. Savidge has found it breeding, and I have also noted it in different parts of Victoria.

Leach's Black Cockatoo is remarkable for individual variation in plumage, and, from the material now before me, especially in the females. Some adult females are sparingly dotted and spotted with yellow on the sides of the head and upper and under wing-coverts, the feathers of the abdomen have narrow, and the under tail-coverts broad, yellow crossbars. Others have the feathers on the throat yellow, margined with orange, in some this yellow colouring extends to portion of the head and hind-neck, and in one abnormally plumaged specimen has one of the quills entirely yellow and washed with orange on the central portion of the outer web, the others being parti-coloured yellow and black, while the apical portion of the outer web of one of the inner secondaries has a long wedge-shaped golden-yellow marking, narrowly edged at the tip with orange-red. In the males the vermilion band on the middle of all but the central pair of tail-feathers crosses both webs, but more often it is narrowly edged with black on both webs, sometimes the outer web of the external feather on either side is entirely black.

Seeds of the different species of *Casuarinas*, obtained by the birds biting through the cones, constitute its favourite food.

Like the other species of the genus, it resorts to a hollow limb, trunk, or stump of a tree, for the purposes of breeding, and only one egg is laid for a sitting. All the nesting-places found by Mr. E. H. Lane in New South Wales were from about twenty to forty feet from the ground, while those found by Mr. H. G. Barnard in Queensland were at an altitude of from seventy to eighty feet.

From Bimbi, Duaringa, Queensland, Mr. H. Greensill Barnard wrote me as follows on the 22nd January, 1909:—"In May and June of 1891 and 1892 we found several nests of *Calyptorhynchus viridis*, the breeding places being similar to those of *C. funereus*, with the exception that we never took more than one egg out of a nest, and about six nests in all were found. These birds were very partial to the seeds of the 'Belar' or Scrub Oak (*Casuarina* sp.), which they cracked open with their powerful bills and extracted the kernel. I have not seen these birds for some years now."

Mr. E. H. Lane, of Orange, New South Wales, has kindly sent me the following notes:—"The first nest of *Calyptorhynchus viridis* I found was on Wambangalang Station, about twenty miles from Dubbo, on the 21st March, 1879. As the tree was ten miles from the homestead, and I could not climb it without a rope, and was leaving home the next day for nearly a fortnight, I lost the opportunity of seeing the contents of this the first nest I ever found of this species. About a fortnight later I got up to another nest, but only found broken pieces of shell, the egg probably having been eaten by one of the numerous Lace Lizards, as I now think it was too early in the season for the young to have left the nest. Having learned so much, I was able to find six nests during March, April and May of the following year, each of which contained but one egg or one young one. All the nests were from about twenty to forty odd feet from the ground, and always in the main trunk of the trees, where a large branch had broken off, or where the tree had broken clean off, leaving a high stump of about eighteen to twenty feet or more. The egg in each instance was laid on the decayed wood at the bottom of the hollow varying from two to four feet deep. Since 1880 I have found about ten or a dozen nests with either one egg

or one young one without a single exception. On the 1st April, 1802, my manager got me one egg, and during the following ten days got three more. On the 22nd April I went out with him and a blackfellow, and the latter climbed six trees, getting from four of the nesting-places one fresh egg in each, and finding a young bird in another, and from the remaining one a young one had apparently just left it. Every nest was in a dead White Box tree, excepting one, which was in a dead Gum. Several of the nesting-places were in the remaining portion of broken off hollow branches, and many feet away from the main trunk, the others being in the trunks, the entrance to which was where a branch had been broken out. The eggs were all laid on the decaying wood found in these cavities, and varied from two to four feet six inches from where they were deposited to the entrance. I got in all that season eight eggs, five being fresh, and three had rather large young ones in them, but which I managed to blow. The last egg I received was taken quite fresh on the 26th of June, 1905, by a friend. The best time to find them is about sun down, when if you hear the screech of the bird in the nesting season you will probably see one or both making for the nest. Most of the nesting-places were in dead trees. All these nests were found on Wambangalang and the Springs Stations, principally on the former."

Mr. George Savidge, of Copmanhurst, Upper Clarence River, New South Wales, writes me as follows:—" *Calyptorhynchus viridis* is, I believe, the commonest species of Black Cockatoo inhabiting this district, although it is not by any means numerous. It is found mostly in pairs and small flocks, and is very fond of gullies containing *Casuarinas*, upon the seeds of which they feed. I have seen places where the ground has been strewn with the husks or leavings of these Oak seed cones, which have been eaten by the birds. They are much easier to approach than the other species of Black Cockatoos. Several of their nests have been found by us. An egg in my cabinet has to me a very interesting history. While taking the egg of Bank's Cockatoo on 13th May, previously alluded to, a farmer friend close by came upon the scene, and informed me he could show me another nest of a Black Cockatoo close to his homestead. It was too late to visit it that evening, so next day, 14th May, 1900, I sent Mr. W. Griffiths and my son out to inspect, and they were shewn the nest, which was, like all those found, situated in the main barrel of a Eucalypt which had been broken off about sixty feet from the ground. The egg was placed on a good few Eucalyptus leaves some distance down, so much so that some of the top had to be broken away before the egg could be reached. This bird was very daring, refusing to leave the tree: my son Clarence could have killed it with a short stick. It put up its feathers, flapped its wings, and bit the tree. Mr. T. Sabien, who showed the boys the nest, was also present and a witness to this extraordinary behaviour. The breeding season here is in April or May."

From Blackwood, South Australia, Mr. Edwin Ashby kindly sends me the following notes:—" *Calyptorhynchus viridis* I met with in the heavily timbered districts of the north coast of Kangaroo Island, and obtained a pair near their nesting-places in a hole in a fairly tall Sugar Gum, about half a mile from the coast, and from which by means of a rope some boys climbed to and secured for me an incubated egg. These birds live there principally on the seeds of the She Oak (*Casuarina quadrivalvis*)."

Writing me while resident at Hamilton, in the Western District of Victoria, Dr. W. Macgillivray remarks:—" *Calyptorhynchus viridis* is not so numerous here as *C. funereus*, and prefers the northern part of the District along the Glenelg River, where it nests, also the scrub near the South Australian border."

Only one egg is laid for a sitting: they vary in size and form from oval to a nearly true ellipse and swollen ellipse, and are of a dull white, the shell being fairly smooth and lustreless, but having minute pittings, invisible as a rule, unless examined with a lens. An egg taken on Wambangalang Station in April, 1880, measures:—Length 1.8 × 1.36 inches. Another taken

on the 1st April, 1892, measures:—Length 1.77 × 1.25 inches. A third egg taken on the 7th May, 1892, measures:—Length 1.8 × 1.25 inches. Three others measure respectively:—Length (A) 1.83 × 1.33 inches; (B) 1.69 × 1.27 inches; (C) 1.74 × 1.25 inches.

March to the beginning of August constitutes the usual breeding season in Eastern Australia, but eggs are more frequently found in April, May and June.

Calyptorhynchus baudini.

BAUDIN'S BLACK COCKATOO.

Calyptorhynchus baudini, Vig., in Lear's Ill. Parr., pl. 6 (1832); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 106 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 10 (1900); Salvad., Ibis, 1906, p. 125.

Calyptorhynchus baudini, Gould, Bds. Austr., fol. Vol. V., pl. 13 (1818); *id.*, Handbk. Bds. Austr., Vol. II., p. 25 (1865).

ADULT MALE.—General colour blackish-brown, with whitish-brown margins to the feathers at the tips, narrow above, broader below; lores, feathers below the eye, cheeks and forehead almost black, the latter with a greenish gloss; ear-coverts dull white; tail-feathers blackish brown, all but the central pair crossed in the middle with a broad white band, except a narrow margin on the outer web; the external web of the outer feather on either side blackish-brown; shafts of the feathers black; "bill lead colour; in some specimens the upper mandible is blackish-brown; legs and feet dull yellowish-grey, tinged with olive" (Gould). Total length in the flesh 22 inches, wing 14.8, tail 11, bill 1.95, tarsus 1.1.

ADULT FEMALE.—Similar in plumage to the male.

Distribution—Western Australia.

BAUDIN'S Black Cockatoo is an inhabitant of the south-western portion of the continent, and may be distinguished from all other species of the genus *Calyptorhynchus* by its strikingly contrasted brownish-black and white plumage; it has no ally. Mr. George Masters, collecting on behalf of the Trustees of the Australian Museum at King George's Sound, Western Australia, in 1867 and 1869, obtained a fine series of skins of both sexes.

From Broome Hill, Western Australia, Mr. Tom Carter writes me:—" *Calyptorhynchus baudini* resides in the Red Gum country, which lies to the west of Broome Hill, but flocks of considerable size occasionally visit us here at various seasons, but do not remain long. They are common at Albany and Denmark, and I have seen them as far north as the Murchison River. A friend of mine, Mr. Bruce W. Leake, pointed out to me a tree from which had been taken two eggs of *C. baudini*. The tree almost overhung a high road leading to Kellerberrin Station, upon which there was a considerable amount of traffic, and the nesting-place was in a hollow spout near the main trunk. On the 7th August, 1908, a neighbour informed me that a pair were nesting in a hole in a Gum-tree thirty feet from the ground, about forty miles from Broome Hill; in the same locality on the 22nd September following a pair were nesting in a hole in a Gum tree, only twelve feet from the ground, and on the 19th October, 1908, fledged young were caught."

Mr. G. A. Kearnland sends me the following note:—"Although *Calyptorhynchus baudini* is generally confined to South-western Australia, I saw several pairs near Mullawa, about sixty miles from Geraldton. They were generally out of range, but I managed to shoot one, which proved to be a female. Near Quindalup they are fairly common, and breed in the neighborhood. Their habits are similar to those of *Calyptorhynchus fuscus*. Their eggs are usually smooth and the shell fine in texture."

Mr. Bruce W. Leake writes me from Cardona, Woolundra, Western Australia:—"The nests of *Calyptorhynchus baudini* I have found have been between thirty and forty-five feet from

the ground, and situated in hollow Eucalyptus trees. The eggs are placed on top of the decayed matter of the tree, about one foot to eighteen inches from the top of the hollow. Two eggs are laid, one apparently several days before the other, as they always appear in different stages of incubation. Generally only one young survives, and it is not an uncommon thing to see two old birds and one young flying about soon after the commencement of the breeding season. These birds are migratory, leaving here for the coast about December and January, and returning in April or May in large flocks. They are not as plentiful as formerly, the advance of settlement having driven them farther afield."

The eggs are two in number for a sitting, oval in form, and fairly smooth-shelled, with the exception of a few limy excrescences, but having numerous minute pittings; they are dull white and lustreless. An egg taken on the 18th August, 1899, by Mr. Bruce W. Leake, of Kellerberrin, Western Australia, measures:—Length 1.88 × 1.35 inches. A set of two eggs in the collection of Mr. H. L. White, of Belltrees, Scone, New South Wales, also taken by Mr. Leake at Kellerberrin on the 30th August, 1897, measure:—Length (A) 1.87 × 1.37 inches; (B) 1.81 × 1.32 inches.

According to Mr. Carter's notes and Mr. Leake's observations August to October constitutes the normal breeding season of this species.

Genus CALLOCEPHALON, Lesson.

Callocephalon galeatum.

GANG GANG COCKATOO.

Psittacus galeatus, Lath., Ind. Orn., Suppl., p. xxiii. (1802).

Callocephalon galeatum, Gould, Bds. Austr., fol. Vol. V., pl. 14 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 29 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 113 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 10 (1900); Salvad., Ibis, 1906, p. 126.

ADULT MALE.—*General colour above dark slaty-grey, all the feathers margined with ashy-white: upper wing-coverts like the back, quills slaty-grey, paler on the greater portion of the primaries, the greater wing coverts and outer webs of the secondaries faintly washed with pale sulphur-yellow: tail dark slaty-grey: forehead, crown of the head, crest and sides of the head scarlet: under surface dull slaty grey, all the feathers indistinctly margined with faint sulphurous-yellow, those on the lower breast, abdomen, and under tail-coverts having also an apical margin of dull red: bill whitish-horn colour, greyish at the base of the upper mandible: legs and feet meaty greyish-black: iris dark brown. Total length in the flesh 14 inches, wing 9.9, tail 6, bill, 1.2 tarsus 0.7.*

ADULT FEMALE.—*Resembles the male, but has the head and crest grey, the feathers of the back, rump, upper tail-coverts and the wings crossed with greyish-white bands, the tail-feathers crossed with freckled bands of lighter grey, and the feathers of the under parts crossed with three white or yellowish-white bands, and broadly margined around the tip with dull scarlet, the sub-apical band being of a clearer yellow on the lower breast: under tail-coverts grey crossed with pale sulphurous-yellow bands, and which are freckled with grey.*

Distribution—New South Wales, Victoria, Tasmania.

THERE are more specimens of the present species in the Australian Museum Collection than of any other Australian Cockatoo. Numerically, in its haunts, it is far from common, but very little is known of its nesting habits, and its eggs are among the rarest of any of the Australian PSITTACI. Of the thirty odd specimens in the Australian Museum, and which exhibit all stages of plumage, which is subject to much variation in the under parts, all, with the exception of one specimen from Victoria, were obtained in different parts of New South Wales, and nearly all in districts South of Sydney. I have never seen in any collection a specimen from

any part of Queensland, or even the Northern Districts of New South Wales. Although no longer to be found close to Sydney, specimens are sometimes received from Smithfield, Liverpool, Appin and Picton, and these birds are freely distributed throughout the heavily timbered districts on the southern parts of the National Park, Moss Vale, Bundanoon, and the Burragorang Valley, the Blue Mountains and throughout the Illawarra District into South-eastern



GANG GANG COCKATOO.

Victoria. In the latter State I have met with it in different parts of the Strzelecki Range, in South Gippsland, and have seen specimens obtained near Fernshaw. Mr. Edwin Ashby also informs me he met with it near Lorne, in the Cape Otway Ranges. In 1897 these birds were unusually numerous in New South Wales, and several were received from the Southern Coastal District and contiguous mountain ranges of the eastern parts of the State. At Boloco Station, near the Victorian border, Mr. A. M. N. Rose informed me he saw over forty birds of this species in one tree. Stomachs of birds I have examined contained only the small seeds of a Eucalyptus. There is very little variation in the wing-measurement of adult specimens, that of the female being slightly greater than that of the male. The wing-measurement of the adult male given in the "Catalogue of Birds in the British Museum," is clearly a typographical error.

At Childers, in South Gippsland, Victoria, I once saw a nesting-place occupied by a pair of these birds, and watched them go in and out of it. In this instance it was quite safe, for it was in a hole in a thick green

upright bough of a lofty and wide spreading smooth-barked Eucalyptus, and fully seventy feet from the ground.

Their note is a whining, squeaking call, and is about the weakest of any of the CACATUIDÆ.

Mr. Robert Grant, Taxidermist of the Australian Museum, has handed me the following notes:—"I have shot Gang Gangs all over the ranges around Lithgow on the Blue Mountains, New South Wales, but particularly at Marrangaroo, Badger Brush, and Sodwalls. In the spring the adults are usually met with in pairs, and in summer are more often seen accompanied by their young. In the autumn and winter months they congregate in flocks from ten to twenty or thirty in number. On one occasion my brother and I shot eighteen from one tree, which were attracted by the cries of two of their wounded mates, lying on the ground. These birds can inflict a nasty bite. A wounded female I attempted to pick up fastened on to my right thumb, the top of which it nearly bit through. On Bell's Line, near the Old Bathurst Road, Clarence Siding, we took nearly a day to chop down a Gum tree in which a pair of these birds were nesting, but failed to discover either eggs or young."

From Marrickville, Sydney, New South Wales, Mr. Percy Peir sends the following notes:—"I have kept quite a number of the Gang Gang Cockatoos (*Calocephalon galeatum*) at various periods, and found that although usually of a morose disposition they are easily tamed, and become great favourites. If kept in company with other talking birds they soon learn to imitate them. With the majority of bird fanciers, and even at our local Zoological Gardens, they are short lived, although I have found them one of the hardiest of the Australian Cockatoos if catered for properly at the commencement. The Gang Gang is a peculiar bird regarding its

* Cat. Bds. Brit. Mus., Vol. XX., p. 114 (1891).

diet, and should be tried with various grains, &c., when it will eventually settle down on one kind for the rest of its days. These birds make an easy target for the so-called sportsman, and a male I have had in my possession for the past six years was shot in the wing, which fortunately caused little damage. The bird was in the young plumage, and it took three years before it was at its best, and each succeeding year the red crest and head became brighter and the body colour greyer. I have seen them in the Nowra District, New South Wales, come in numbers at dusk, crashing into the ripening corn, and in a short while do considerable damage. Although I have never seen the nesting-place, on several occasions the farm lads brought in broods of young birds. I have never succeeded in breeding them in confinement, although I repeatedly saw the male bird dancing before the female, throwing his head forward, spreading his crest and croaking and cackling in a peculiar manner."

From Melbourne, Victoria, Mr. G. A. Kearthland sends me the following note:—"Whilst most species of Cockatoos feed principally on grain or leguminous seeds, *Callocephalon galeatum* lives almost exclusively on the seed of the Eucalypt. I recently skinned a pair of Gang Gang Cockatoos from Croydon, and from the crop of each bird took an egg-cupfull of Eucalyptus seed; in fact, when killed their flesh smells strongly of this food. They are usually seen in pairs, but during the winter months they congregate in flocks. On two occasions I have seen them on the bush tracks in the Dandenong Ranges picking over the droppings from the carters' horses. Some of the male birds acquire the scarlet on their heads at a very early age. One that I kept for some time was scarlet on the head before it could feed itself."

An egg of this species in Mr. G. A. Kearthland's collection, taken at South Gippsland, Victoria, is a rounded oval in form, white, the shell being close-grained, but thickly and finely pitted and lustreless. It measures:—Length 1.35 × 1.11 inches.

Of half-fledged birds taken from nesting-places I have seen a number. On the 20th January, 1892, M. Octave Le Bon had eight young birds, taken by a bird-catcher at Murrumburrah, New South Wales. He informed me that the man who obtained them found two birds in each nesting-place. On the 2nd February, 1893, I saw two more young birds in M. Le Bon's shop taken by the same bird-catcher, and in the same locality as the previous year. Near the General Post Office, Sydney, on the 8th June, 1900, I saw a fledged male and female for sale in George Street. Excepting the different species of Black Cockatoos, these birds used to command a higher price than any other species of Australian PSITTACI. I have known £15 15s. to be offered for a pair of adult birds, £2 paid for a young bird, and I am aware of their being sold for 15/- each. Young birds are very difficult to rear, and that is probably the reason there are so many young specimens in the collection of the Australian Museum.

Young males resemble the adult females, except on the feathers of the back, which have no pale or dull grey cross-bar; on the under parts either the sulphur-yellow or dull scarlet margins to the feathers may predominate, or, as is more often the case, there is an admixture of both these colours, some of the feathers on the forehead are tipped with dull scarlet, and the crest feathers are dull scarlet with grey bases. Wing 9 inches. The last trace of immaturity is exhibited in a nearly adult male by the remains of indistinct greyish barrings on the tail-feathers.

In New South Wales the normal breeding season is during October and the three following months. At Mount Victoria, on the Blue Mountains, three thousand four hundred and twenty-four feet above the sea level, I noted on the 6th March, 1909, a pair of adults. They were remarkably tame, and low down in the wide-spreading branches of a Eucalyptus, the male feeding himself, but the female stopped now and again to attend to the wants of a pair of fully fledged young ones, the male of which had the crest scarlet, the young female exhibiting the barrings on the under parts of the plumage. I saw this same flock of birds several times during the previous week, and it was evident that the young ones were bred in the neighbourhood.

The figure represents an adult male.

Genus CACATUA, Vieillot.

Cacatua galerita.

SULPHUR-CRESTED COCKATOO.

Psittacus galeritus, Lath., Ind. Orn., Vol. I., p. 109 (1790).

Cacatua galerita, Gould, Bds. Austr., fol. Vol. V., pl. 1 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 2 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX, p. 116 (1891); Sharpe, Handl. Bds., Vol. II., p. 10 (1900); Salvad., Ibis, 1906, p. 126.

ADULT MALE.—Above and below white, an elongated occipital crest rich sulphur-yellow; bases of feathers of head and hind-neck pale sulphur-yellow; basal half of inner web of quills and of the tail-feathers, except the central pair, sulphur-yellow; bill greyish-black; legs and feet nearly greyish-black; naked skin around the eye white, with a slight bluish shade on the extreme edge of the eyelid; iris black. Total length in the flesh 19 inches, wing 13.5, tail 8, bill 1.8, tarsus 1.1.

ADULT FEMALE.—Similar in plumage to the male.

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Larger Islands of Bass Strait, Tasmania.

DOUBTLESS there are but few people in Australia or Tasmania who have not seen, either in its native haunts, or in captivity, the Sulphur-crested Cockatoo. White, the Surgeon-General of the "Settlement of New South Wales," figured it in his "Journal" in 1790 under the name of the Crested Cockatoo. In the same year Latham characterised it in his "Index Ornithologicus," under the name of *Psittacus galeritus*, and gave its habitat as New South Wales. Since that time nearly every writer on Australian Ornithology has made reference to it, and Sturt, Leichhardt, Grey and many other Australian explorers have noted it in their travels, for its range extends throughout all the States, likewise Tasmania. Not only is the Sulphur-crested Cockatoo brought into prominence in literature, but it is frequently depicted by artists in Australian landscapes, the dark green background of a timber-clad mountain range forming a strong contrast to the plumage of a flock of these almost pure white birds during flight.

With a species having so wide a distribution, it is natural that one finds a great difference in size when a large series of skins are brought together and examined. The variation in plumage is small, and is chiefly in the ear-coverts; in many they are white, or show but a slight tinge of their pale sulphur-yellow bases; in a few only they are pale sulphur-yellow. I have seen traces of melanism pervading the quills of young birds, and there is an adult male in the Australian Museum Collection, obtained by Mr. Robert Grant at Fernmount, on the Bellinger River, New South Wales, with a faint blackish wash on the quills and outer series of greater wing-coverts, the shafts of some of the quills being brownish-black. The wing measurement varies in adult specimens obtained even in the same locality. Typically the birds from South-eastern Australia are larger than those from Northern and North-western Australia, and the measurements given above are those of a New South Wales specimen. The longest crested birds in the Australian Museum Collection were obtained by Mr. George Masters on Pine Mountain, in March 1865, and at Gaydah, Burnett River, Queensland, in September 1870.

Near the coast it frequents mountain ranges and open forest lands, and in the interior usually the tall timber bordering creeks and rivers, in fact its presence is a sure indication of water in the vicinity. Although found near Sydney in the early days of settlement, it is now seldom seen east of the Nepean River, but is common on parts of the Blue Mountains and on the table-lands of the western slopes.

* Ind. Orn., Vol. I., p. 109 (1790)

The normal food of this species consists of seeds of various kinds and bulbous roots. It is also very destructive in cultivation paddocks when the grain is sown, and again when it is ready to harvest, assembling in immense flocks in agricultural areas and committing great depredations. A merciless warfare is constantly waged against it, but so wary are they when feasting in a newly planted paddock, or standing crop, that it is difficult to get within range, sentinels always keeping watch, usually on the tops of high trees, and giving warning with their harsh and discordant notes on the approach of danger. In addition to the ravages committed by the Sulphur-crested Cockatoo, it seems to take a delight in nipping off the blossom or leafy twigs in a spirit of pure mischief, a peculiarity shared by many members of this family. Respecting the destructive habits of this species in North-eastern Queensland, Dr. E. P. Ramsay wrote:†—*Cacatua galerita* seems universally dispersed over the whole of Australia, and it is not one whit the less mischievous in the Cardwell District than any other. I found that these birds frequented the Palm trees when the seeds are ripening, and there perched on the fruiting stems amused themselves biting off the strings of red or green berries, and watching them as they fell to the ground. I have noticed it in New South Wales treating some of the flowering *Eucalypti* in the same way, and have frequently seen large trees with scarcely a bough untouched, and the whole ground underneath strewn with the leaves and branches. It seldom eats either the blossoms or the capsules of the *Eucalypti*, although they do feed on the Palm (*Ptychosperma alexandriae*) berries, and afterwards begin its work of destruction.

Stomachs of birds shot in April at Tarana, New South Wales, all contained coarse gravel, and some well ground maize. Others contained seeds of various kinds and portions of tuberous roots.

From Bimbi, Duaringa, Queensland, Mr. H. Greensill Barnard wrote me:—“*Cacatua galerita* bred very early in 1908, and several nests visited in August contained young. The majority of the nests examined this season contained three young ones, and out of three sets of eggs taken two contained three eggs; this is unusual, as it is generally about one set in four that contain three eggs, the usual set being two, and I have known of several instances of only one egg being laid, and I once took a set of four. The nest taken in 1908 containing the set of two eggs, was in a large Swamp Gum, and as the birds had bred there the year before I expected they would frequent the same locality again. On reaching the place and tapping the tree with my tomahawk, a bird flew out. I ascended the tree in the usual manner, by cutting steps, and on getting to the hole was surprised to see a Cockatoo sitting at the bottom, about fifteen inches from the entrance. How to find out what she was sitting on was the puzzle. I first tried to lift her over with a stick, but she would not budge; then I folded my felt hat, and placing it over the bird worked my hand quietly under her and secured a pair of eggs slightly sat upon. I have never known a Cockatoo to remain in the hole before when I have been climbing the tree. The usual breeding months in this district are September and October, and the situation of the nest a large hole in a Gum-tree, any height from thirty to seventy feet from the ground, and the depth of the nesting hollow is from one to six feet.”

Mr. George Savidge, of Copmanhurst, Upper Clarence River, New South Wales, writes me as follows:—“*Cacatua galerita* was at one time very numerous in this district, but the havoc it played on the ripening maize fields and upon newly planted grounds caused it to be persecuted, poisoned and shot to such an extent that amongst the more settled parts it is indeed a rare bird. I have seen the ground white with them pulling up the maize as it showed above ground, and soon destroying a whole field of it. In the early days poisoning was chiefly resorted to, maize being soaked in strychnine diluted in water, and scattered about. Upon one occasion I saw the poor creatures laying dead in large numbers in the bush. These birds are wary and difficult to approach, and seem to know a gun; it is seldom one can give them a surprise, although the tall

† Proc. Zool. Soc., 1875, p. 601.

maize gives one good cover to do so; several of their mates always mount guard on the loftiest trees to give the alarm. The nesting-places I have found contained two eggs in each, and they were generally in the tall Eucalyptus in quiet remote places."

Mr. H. L. White, of Belltrees, Scone, has sent me the following notes:—" *Cacatua galerita* is extremely plentiful and very mischievous, causing considerable damage to the maize crops. When pressed for food in the winter months they attack pumpkins and pie melons, into which they tear large holes and devour the seeds. I have noted hundreds of pie melons along the river banks with the seeds scooped right out by the Cockatoos. These birds apparently occupy the same roosting quarters for a great length of time. I have known a flock of several hundreds, during the past thirty-five years, to roost in the same clump of timber every night. Very old residents state that the site referred to has been used by the birds ever since the district was settled. The noise made when going to roost is very remarkable, and not easily forgotten. During these years of observation, many of the roosting trees have died, killed evidently by the birds nipping the small twigs off. When a tree dies it is abandoned for a living one in close proximity. In my younger days I frequently raided the roosts on moonlight nights and shot dozens of the birds, but the site was never entirely deserted. Nests are common, and invariably in holes in the highest trees growing near rivers or creeks."

While resident at Hamilton, in Victoria, Dr. W. Macgillivray sent me the following note:—" *Cacatua galerita* and *Licmetis ussica* are numerically very strong, large flocks of either species being no uncommon sight, especially on the newly sown crops in late autumn. A family of bird-catchers in Hamilton sent over three hundred young birds of these two species away to market in 1899, and have been doing the same for the last fifteen years without appreciably diminishing their numbers." Since resident at Broken Hill, in South-western New South Wales, Dr. Macgillivray writes:—" *Cacatua galerita* is common on the Darling River, and breeds there, but does not invade the back country. Young birds are often brought over here from about Menindie."

Dr. L. Holden writes as follows from Southern Tasmania:—"On the 18th December, 1899, I saw a flock of twenty-four White Cockatoos (*Cacatua galerita*) fly over Glenora Railway Station, making their usual discordant noise, and I have seen large flocks in the Derwent Valley, also at the Styx River."

From Waratah, Mount Bischoff, Tasmania, Mr. E. D. Atkinson sends the following note:—"I have never known *Cacatua galerita* anywhere more abundant than in the open country on the west coast of Tasmania, where I have seen flocks of hundreds busily engaged feeding amongst the sea-weed on the beaches. Also, I have met with it in large numbers in the thickly wooded ranges near Rockingham Bay, Queensland."

From Glenorchy, Tasmania, Mr. Malcolm Harrison writes me:—"Some years ago *Cacatua galerita* was plentiful, comparatively speaking, in those parts of Tasmania with which I was best acquainted, viz., the midland portions. I can remember it appearing in considerable flocks around the grain fields ready to take toll as soon as opportunity offered. War was declared against them, and many a weary tramp have I had in a vain effort to get at them with a gun. The wary sentinels, however, perched on the topmost branches of the highest neighbouring trees, rarely failed to prevent an approach within gunshot, and one had to be contented to scare the birds away without injuring them. My opportunities of observation are now certainly limited, but from what I can see and learn they are not now to be found in anything like their former numbers. I have not myself observed them south of the Derwent River, but a few seasons ago found a pair nesting at Glenora, near that river."

The nesting-place usually selected is in a hollow spout or trunk of a Eucalyptus, a dead tree being frequently chosen, and often at a great height from the ground.

The eggs are usually two or three in number for a sitting, occasionally only one, rarely four, and vary from oval to thick and elongate-oval in form, some specimens being somewhat sharply pointed at the smaller end. They are white, but are usually more or less stained with the decayed wood on which they are laid, and typically are rough shelled, although specimens are often found with a comparatively smooth shell, and having minute shallow pittings: as a rule they are lustreless, but some have a slight gloss. A set of two received from the late Mr. George Barnard, and taken at Coomooboolaroo, Duaringa, Queensland, on the 12th August, 1899, measures:—Length (A) 1.96 × 1.32 inches; (B) 1.95 × 1.33 inches. A set of three taken by Mr. H. G. Barnard in the same locality, on the 10th September, 1893, measures:—Length (A) 1.87 × 1.38 inches; (B) 1.83 × 1.38 inches; (C) 1.87 × 1.33 inches. He also took a set of three on the 20th September, 1908, at Bimbi, Duaringa, Queensland, which measures:—Length (A) 1.94 × 1.38 inches; (B) 1.92 × 1.39 inches; (C) 1.87 × 1.34 inches.

Young birds assume the adult plumage before they leave the nesting-place, and there is nothing to distinguish them by when six months old except their smaller size.

In Eastern Australia the usual breeding season is August and the three following months, but it is greatly influenced by the rains. I have seen young birds recently taken from the nesting-places, exposed for sale in baskets, in the streets of Sydney at all seasons. Of unusual times they were noted, in 1896, on the 28th February and the 15th May. The united cries of a number of young birds in a dealer's shop, clamouring to be fed, is at times simply deafening. I have seen four persons engaged at the one time in feeding them, the treatment of all being alike. Seated on boxes, with a bowl of well boiled maize at hand, each bird is picked up, placed on the feeder's apron, the mandibles opened, and then the bird filled up with maize, until it refuses to take any more. It is then quiet and put on one side. Young birds that have to be hand fed always have a soiled look about the mouth. Those reared from the nest make great pets, but if allowed to roam at pleasure about the house, as they frequently are in country districts, are very destructive, as many indulgent owners know to their cost, for they have a *penchant* for biting or gnawing any woodwork, and an example may be seen in the Botanic Gardens, Sydney, where the wooden ceiling to their aviary is eaten away in parts, and which has been covered with tin. In confinement they usually acquire an extensive vocabulary, and live to a great age. One died in Sydney, in 1887, that had been in the possession of the late Mr. William Wentworth for a great number of years, and it was believed to be over a century old at the time of its death. This specimen was presented to the Trustees of the Australian Museum.

While at Cobborah Station, Cobborah, New South Wales, in October, 1909, I was much amused with one of these birds, which Mr. Austin had taken from a nesting-place in a hollow limb of a tree on the station, four years before. It was a very good talker, and was in gayest mood about 6 a.m. and 4 p.m. Kept on the verandah of the homestead, which was furnished with the usual lounge and easy chairs, and facing the garden, it had an opportunity of acquiring a vocabulary from the conversation of visitors, and remarks made to it by Mr. Austin and others in passing. Its chief playmate was a dog, and numerous romps did the pair of them have together. It is needless to relate the many phrases it had acquired, but it had an extensive and varied repertoire. "Piece of cake for Cockatoo" was one of its pet phrases, and "Cocky wants a drink" another, and they were usually persisted in until its wants were supplied. It would imitate the dog barking, and finish up by calling out loudly "Hallo, Juno," at the same time having its wings outspread, head lowered, crest erect, and twisting and turning his body from side to side. In two things especially it excelled, in imitating a person singing, and carrying on in two different voices an imaginary conversation. Of course there was no syllabication of words, but the inflection of the two different voices was most marked, and undoubtedly it was picked up from what it heard on the verandah. The imitation of singing and of a conversation between two persons, would usually last for about ten minutes.

EXPLANATION OF PLATE A. 14.

“Fred,” a Nymboidia Aboriginal, at a nesting-place of the Blue-bellied Lorikeet (*Trichoglossus nove-hollandiae*). The eggs, two in number, were taken from near the end of the hollow limb beneath his feet. Reproduced from a photograph taken in 1898 by Mr. George Savidge, at Copmanhurst, New South Wales.



Cacatua leadbeateri.

LEADBEATER'S COCKATOO.

Ptytolophus leadbeateri, Vig., Proc. Zool. Soc., 1831, p. 61.

Cacatua leadbeateri, Gould, Bds. Austr., fol. Vol. V., pl. 2 (1818); *id.*, Handbk. Bds. Austr., Vol. II., p. 5 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 123 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 11 (1900); Salvad., Ibis, 1906, p. 130.

ADULT MALE.—*General colour above white, the inner webs of the quills and all but the central pair of tail-feathers, except towards the tips, rose colour; crown of the head and the anterior crest feathers white, the remainder of the latter white, crimson at the base, with a spot of yellow in the centre; a narrow frontal band rosy-red; sides of head, hind-neck, cheeks, throat and breast rose colour; bill light horn colour; legs and feet dark woody grey; skin around the eyes pale creamy-white; iris dark brown. Total length in the flesh 16.25 inches, wing 10.8, tail 6.3, bill 1.3, tarsus 0.9.*

ADULT FEMALE—*Similar in plumage to the male, but slightly paler and having more yellow in the crest feathers.*

Distribution—New South Wales, Victoria, South Australia, Central Australia, Western Australia, North-western Australia.

THE inland portions of the southern half of the Australian continent constitutes the stronghold of the present species, more familiarly known as the "Major Mitchell," or by the popular name of "Wee-juggler." It is probably the most delicately coloured of all the

Australian Cockatoos, but its reputation as a talker is far behind that of all other species. It is freely distributed throughout Western New South Wales, and the Horn Scientific Expedition met with it in Central Australia, in 1894, near Finke Gorge, and specimens were obtained at Alice Well. Dr. A. M. Morgan sent me a note that during his trip with Dr. A. Chenery, in August 1902, "*Cacatua leadbeateri* was seen first at Wippipipee Rock Holes, a flock of about one hundred. This species was afterwards seen in smaller flocks, but never far from water. At Wippipipee a female was shot, whose stomach contained some seeds with a very hard pericarp. These birds came in for water several times a day." In Western Australia Mr. Tom Carter met with it on the Lower Murchison River, and Mr. G. A. Keartland, in the Great Desert of North-western Australia, while a member of the Calvert Exploring Expedition in 1896.



LEADBEATER'S COCKATOO.

The late Mr. K. H. Bennet made the following notes at Moolah, in Western New South Wales:—"The chief haunt of *Cacatua leadbeateri* is the thickly timbered or scrubby and arid country situated between the Lachlan and Darling Rivers, where it is extremely numerous in some localities, but generally it is met with in small flocks of eight or ten individuals.

"Its food consists of various kinds of seeds, some obtained from trees and others from small herbaceous plants; it also feasts upon the seeds of a small species of wild melon, which grows in large quantities throughout this part of the country. When its hunger is appeased it has a habit of cutting off the smaller branches of the trees or shrubs in which it may be resting. It

also tears off the bark of the larger branches, or the trunks of trees, until the ground beneath is strewn with small branches, leaves and fragments of bark. This destruction is particularly noticeable in the vicinity of the trees in which they may be breeding, and I have frequently seen an old male engaged for hours at this pastime in the tree where his mate was engaged in the duties of incubation.

“Like all the other members of this family, it breeds in the trunks of hollow trees during the months of September and October, and lays three white eggs. In July, 1889, I obtained a set of two eggs of *Aquila audax*, under somewhat difficult circumstances. Having climbed the tree to the bottom of the huge nest, seventy feet from the ground, I had to cut with my tomahawk through the boughs and sticks of the base of the nest, when I came to the interior of it, and found it simply a mass of soft mould, the result of the decomposition of the successive linings of Eucalyptus leaves, placed there by the birds each season. Through this mass I easily worked my arm as far as I could reach, but much to my disappointment found, by poking a thin stick through, that I was still six or eight inches from the eggs. Eventually I secured both eggs by affixing my soft felt hat at the bottom of the opening, and working a hole with the stick sufficiently large enough for one of the eggs to fall with a dull thud through the bottom of the nest into my hat, which I removed, and then obtained the second egg in a similar manner. On reaching the ground I glanced up at the nest, and could see an opening of about six inches in diameter right through from bottom to top.

“Happening to pass that way about two months afterwards, I noticed a *Cacatua leadbeateri* perched on one of the projecting sticks of the Eagle’s nest, close to the bottom of the opening I had made, and on riding beneath the tree it flew off uttering a note of warning, which had the effect of bringing his mate out of the opening. On ascending the tree I found the Cockatoos had constructed their nest inside that of the Wedge-tailed Eagles, which they had done by entering at the bottom of the opening and scooping out a cavity in the mould at the side, in which were three fresh eggs.

“As cage birds, beyond their beauty, they are uninteresting, for I have never known an instance of one being taught a word, and if allowed their liberty about a house or garden they are exceedingly mischievous. It has, however, a very affectionate nature, as well as a retentive memory. One I had was much attached to me, and would follow me everywhere in my rides on the run, flying from tree to tree whilst I remained in the timber, and when tired would alight on my head or shoulder until he had rested. Leaving me again he would meet me later on when nearing home, but sometimes he would be absent for two or three days. On one occasion I was absent from home for nine months, and although he did not see me return, recognised my voice, instantly flew into the house and settled on my shoulder, rubbing his head against my cheek, and all the while emitting a low gurgling note expressive of gratification.”

Mr. Robt. Grant, Taxidermist of the Australian Museum, has given me the following notes:—“I found *Cacatua leadbeateri* in scattered pairs in the more thickly timbered parts of the bush around Byrock, Glenariff, and Bourke. In the morning they congregated in small flocks of about eight or nine in number, and went to the tanks to drink, and on one occasion I secured five specimens at one shot. I have cut down trees for their nests, and found one inside a hollow limb of the tree about four feet down from the entrance; this nest contained two fledgelings. One peculiar thing I noticed underneath the nest, which was constructed of decayed wood and leaves, was a layer of smooth water-worn pebbles, about four or five inches in depth. Another tree I felled contained two white eggs, both of which were broken; this nesting-place also had a layer of broken pebbles four or five inches in depth. I think the reason of these pebbles being placed there is to keep the eggs dry, when the rain runs down inside the limb, and that they retain the natural heat of the parent bird. Usually these birds fly together to drink in pairs, for mutual protection against birds of prey, which are numerous in these districts.”

Dr. W. Macgillivray has sent me the following notes from Broken Hill, in South-western New South Wales:—" *Cacatua leadbeateri* is not found on the Barrier Range, but is common on Scrope's Range, between Broken Hill and the river to the north-east, and in various places both south and north of Broken Hill; it is not so widely dispersed as either *C. sanguinea* or *C. roseicapilla*. Mrs. Barker, of Buckalow Station, about sixty miles south from here, tells me she has often seen flocks of them feeding on the wild melon, which grows all over the country about here.

"During September, 1908, I found these Cockatoos nesting on Cox Flats, of the Mulga scrub country, and on the creeks which run through it. They usually choose a large roomy hollow, and lay three or four eggs on a bed of decayed wood material, the eggs being usually at a depth of two to three feet. When incubating they come to water morning and evening, and take it in turns to do so, often flying three or four miles to drink; they fly slowly, and one bird often comes to water nearly an hour after the other. A pair of birds will occupy the same hollow year after year. On the nesting-tree being approached, the outside bird gives the alarm, and the mate flies screeching from the hollow, unlike the Blood-stained Cockatoo, which usually leaves its nest very quietly."

Mr. Edward Lord Ramsay wrote me as follows from Wilgaroon Station, in Western New South Wales:—"On the 14th September, 1889, I found a nesting place of *Cacatua leadbeateri* in a big Box tree, and after cutting thirty steps in it managed to secure a set of three fresh eggs. Here these birds usually select the most inaccessible trees to nest in."

Mr. G. A. Keartland writes me from Melbourne, Victoria:—" *Cacatua leadbeateri* is an inland species, and is found in the most inhospitable portions of the interior, where it is usually seen in pairs or small flocks consisting of parents and young. Those shot whilst I was on the exploring expeditions had their crops filled with seed, which looked like skinned peas. Each of the wells we sank in the Great Desert of North-western Australia, was visited by a pair or more of these birds, which came to drink and then went away. In the Wimmera District of Victoria they are numerous, and assemble in small flocks, when many of them are trapped and brought to Melbourne for sale. If taken young they soon learn to speak, but are very poor talkers compared with other Cockatoos."

From Western Australia Mr. Tom Carter writes me:—"The only part of Western Australia in which I have seen *Cacatua leadbeateri*, was on the Lower Murchison River, near a range of cliffs."

The nesting-place is in a hollow, usually of a Gum tree, at a height ranging from fifteen to sixty feet from the ground.

The eggs are three in number for a sitting, oval or long oval in form, pure white, the shell being close-grained and its surface almost lustreless. A set taken on the 8th September, 1885, by the late Mr. K. H. Bennett, at Ivanhoe, New South Wales, measures:—Length (A) 1.55 × 1.13 inches; (B) 1.52 × 1.13 inches; (C) 1.53 × 1.08 inches. A set of three taken from a hollow in a Gum tree fifteen feet from the ground, from which the bird was flushed by Dr. W. Macgillivray, in company with Mr. William McLennan, at Sleep's Well Creek, forty-five miles north of Broken Hill, in South-western New South Wales, on the 23rd September, 1908, measures:—Length (A) 1.38 × 1.05 inches; (B) 1.37 × 1 inches; (C) 1.43 × 1 inches.

Young birds resemble the adults, but are paler on the rose-coloured parts. Wing 9.9 inches.

In New South Wales September and the two following months constitutes the usual breeding season of this species.

Cacatua sanguinea

BLOOD-STAINED COCKATOO.

Cacatua sanguinea, Gould, Proc. Zool. Soc., 1842, p. 138; Sturt, Exped. Centr. Austr., Vol. II., App. p. 36 (1849); Gould, Handbk. Bds. Austr., Vol. II., p. 6 (1865).

Cacatua gymnopsis, Sclat., Proc. Zool. Soc., 1871, pp. 490-493; Sharpe, in Gould's Bds. of New Guin., Vol. V., pl. 46 (1885); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 127 (1891); North, Proc. Linn. Soc. N.S.W. (2nd Ser.), Vol. IX., pp. 37-38 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 11 (1900); Salvad., Ibis, 1906, p. 130.

ADULT MALE.—General plumage white, lores red, bases of the feathers of the head rosy; basal portion of the inner webs of the quills sulphur-yellow; inner webs of all but the central pair of tail-feathers sulphur-yellow; bill light horn colour, with a very faint bluish shade on the sides of the upper mandible in some birds; legs and feet dark acaly-grey; bare space around the eye dark bluish-grey; iris blackish-brown. Total length in the flesh 15.5 inches, wing 10.6, tail 5.7, bill 1.33, tarsus 0.9.

ADULT FEMALE.—Similar in plumage to the male.

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, South Australia, Western Australia.

WERE it not that those eminent authorities, Dr. P. L. Sclater, late secretary of the Zoological Society, London, and Count Salvadori, Director of the Zoological Museum, Turin, Italy, agree in declaring that the naked skin around the eye of *Cacatua sanguinea*, Gould, is white, I should have long ago sunk *Cacatua gymnopsis*, Sclater, into a synonym of *C. sanguinea*. In his folio edition of the Birds of Australia, Gould in referring to *C. sanguinea* remarks:—"With the exception of a specimen brought home by Captain Chambers, R.N., and another in the collection of Mr. Bankier, my own specimens are all that I have ever seen; the whole of these were collected at Port Essington." The old settlement at Port Essington was long ago abandoned in favour of Port Darwin, consequently it is seldom visited by collectors, in fact I know of no one collecting there since the late Mr. Alexander Morton did on behalf of the Trustees of the Australian Museum, in 1870. The Northern Territory of South Australia is not, however, the *terra incognita* of Gould's day, principally owing to the opening up of the country for pastoral purposes, and by prospecting parties in search of minerals, and the same may be said of North-western Australia, which Gould includes in the habitat of *Cacatua sanguinea*. Dr. Sclater described *C. gymnopsis* from a living bird, and gives the habitat as South Australia; he also examined in the British Museum the skins obtained by the late Captain Charles Sturt in South Australia, and refers them to *C. gymnopsis*. I have examined a large number of specimens, and more than a thousand living examples, during the last quarter of a century, and have made inquiries from bird catchers and dealers, but have failed as yet to discover a bird from any part of Australia with the naked skin around the eye white, as Gould figures *Cacatua sanguinea* in his "Birds of Australia."* From Dr. W. Macgillivray's notes, however, it will be observed that he has "seen a few old birds in which it was quite white; whether this was an age change or due to an excessive secretion of powder down I am not certain." Gould described the type of *Cacatua sanguinea*, in 1842, from a dried skin obtained in Northern Australia, and made no reference to the colour of the naked skin around the eye, but in his figure of this species this part is represented as white.

Writing to Dr. Macgillivray, and stating I had long ago come to the conclusion that *Cacatua gymnopsis* was a synonym of *C. sanguinea*, and asking him for his opinion, he replied:—"My opinion, and Mr. McLennan's also, of *Cacatua sanguinea* v. *C. gymnopsis*, is that they are one and

* Gould, Bds. Austr., fol. Vol. V., pl. 3 (1848).

the same. The birds from the Barrier Range, in this neighbourhood, are identical in every respect with the birds from the Gulf District, Northern Queensland."

The wing-measurement of adult males varies from 10·4 to 11·75 inches.

Omitting the extreme south-western portion, the range of the Blood-stained Cockatoo extends over the greater part of the remainder of the Australian continent. Mr. E. J. Cairn and the late Mr. T. H. Bowyer-Bower obtained specimens near Derby, North-western Australia in 1886, and Mr. Tom Carter obtained it near Point Cloates; there are specimens in the Australian Museum Collection, received from the Perth Museum, procured at Broome in June, 1896. Mr. G. A. Keartland, while a member of the Calvert Exploring Expedition, met with it in 1896 near Geraldton, Western Australia; the late Mr. Edward Spalding procured specimens near Port Darwin, in the Northern Territory of South Australia, and Dr. E. Hartert records it under the name of *C. gymnopsis* also from the Northern Territory.* There is a specimen in the Australian Museum Collection procured by the late Mr. Kendal Broadbent at the Gulf of Carpentaria in 1874, and Dr. W. Macgillivray has noted it as occurring in vast flocks in the Cloncurry District, about two hundred miles further south, and a specimen was received from Mr. Fred. L. Berneys, of Wyangarie, Northern Queensland. In Western New South Wales and the adjoining portions of South Australia, it is remarkably common. Sturt obtained specimens at Depot Glen, midway between Milparinka and Tibooburra, in North-western New South Wales, and not in Central or South Australia, as has been so frequently and erroneously recorded. The late Mr. K. H. Bennett found it inhabiting South-western New South Wales, and from the same part of the State Dr. W. Macgillivray has forwarded some very interesting notes relative to the habits and breeding of this species.

Two living examples of the Blood-stained Cockatoo I saw in 1893 were in the old George-street Markets, Sydney. The first one was taken by its owner, M. Eugene Etable, from a nesting-place in a hollow branch of a tree, and he captured the other, when just able to flutter along the ground, at a place about six miles south of Burketown, twenty miles south of the Gulf of Carpentaria, in Northern Queensland. M. Etable informed me that this species bred in the district only during the wet season, and is influenced by the latter being early or late, the usual breeding time commencing in February and continuing until the beginning of May. During the dry season it assembles in large flocks, and remains in the neighbourhood of tanks and water holes. M. Etable has observed these birds, but not in such great numbers, as far east and south in the intervening country over which he has travelled between Croydon, Hughenden and Barcardine. Since then I have observed at intervals, sometimes of several years, cages of these birds in various dealers' shops in Sydney, some of them received by way of Port Darwin, others from Adelaide and Melbourne, procured in the south-western portion of New South Wales.

The following notes were made by the late Mr. K. H. Bennett at Moolah, Western New South Wales:—"The only occasion on which I have met with *Cacatua sanguinea* was during an exploring trip in the Barrier Ranges, in November 1874. In this locality I met with them frequently, in the vicinity of the numerous sandy creeks, bordered with large Gum trees that extend for some distance from these rugged ranges, and in which I found them breeding. When I first observed these birds they were on the wing, and a long way off, but that evening when camped on one of the water-holes a flock came to drink, and having a gun I soon had an example in my hand. Previously I had never seen this species."

Dr. W. Macgillivray sent me the following note relative to this species in the Cloncurry District, Northern Queensland:—" *Cacatua sanguinea* is distinctly gregarious, the flocks flying on to the downs just after sunrise, where they feed on the ground for two or more hours,

* Nov. Zool., Vol. XL., p. 211 (1905).

then fly in to the creek, and settle on one or more trees, according to the number of birds, and amuse themselves during the rest of the day in stripping every leaf, twig and nearly all the bark off the trees; in this way they completely destroy many trees, as far as all the upper limbs are concerned. When one tree is fairly bare, they devote their attention to another, and treat it similarly; towards evening they again fly on to the plains to feed for an hour or two before

returning to roost. A small bulbous plant growing in patches on the plains is a favourite article of diet, and it is also relished by the blacks. It breeds during the wet season."

Later on Dr. W. Macgillivray wrote me as follows from Broken Hill, in South-western New South Wales:—" *Cacatua sanguinea* is a very common bird here at all seasons. They do not migrate from the district, but congregate in whatever part has the most abundant food supply, and this of course depends upon our autumn and spring rains, which are often very patchy and variable in amount, or often absent altogether; the class of herbage which comes up depends upon the time when the rain has been most abundant. When the season is very dry few of these birds breed at all. The birds are all of the one type, being white with sulphur tinting of the primaries and rectrices, and an orange-red tinting of the lores; this reddish colouring is more marked in very young birds. The bare skin round the eyes is always of a leaden colour, being lighter or darker as there is less or more powder down upon it. The breeding season commences late in August, eggs are abundant in September, and young birds in October, although in a very good season young birds may be taken after the New Year. But whether good or bad season, the first eggs are invariably laid during the last week in August. They nest on all the creeks about here in the Gums, at an average height of about twenty-five feet, the hollow averaging



AT A NESTING PLACE OF THE BLOOD-STAINED COCKATOO.

three feet in depth. The eggs are almost invariably three in number, sometimes two; I only once remember seeing four young ones taken from a nest. The eggs repose on the decayed wood dust and chippings at the bottom of the hollow. The entrance is often bitten round by the bird, and a little piece of white down frequently adheres to it, and is a sure indication that a bird has been in or out. The young leave the nest about a month after being hatched, and are fed for some time by the parents.

“Odd situations are sometimes chosen for nesting, one hollow, about twenty feet from the ground, found on the 13th October, 1906, on Campbell Creek, Broken Hill, had its entrance just below a Wedge-tailed Eagle's nest. The accompanying photograph, which I took that day, shows Mr. Wm. McLennan with his hand on the entrance to it. The hollow contained three fully fledged young *Cacatua sanguinea*; the Wedge-tailed Eagle's nest was unoccupied. Another was under a Whistling Eagle's nest, both being occupied. Another again was at the base of a branch which held a Goshawk's (*Astur approximans*) nest and eggs. I have very often seen more than one nest in the same tree. We camped under a tree on Campbell Creek last year which contained four young Cockatoos in one hollow, three eggs of the same species in another, and four chipped eggs of the Boobook Owl in another. Then in another tree one hollow contained three very young Cockatoos, another hollow five fresh eggs of Barnard's Parrakeet; higher up in the same limb three eggs of the Cockatoo-Parrakeet, and in other parts of the same tree were two nests with young of the Tree Swallow.

“After the nesting season they assemble in flocks, which must number at times some thousands. They then roost in the Gums at night, and fly out to their feeding grounds at dawn. I noted them on the 13th of October, 1906, flying out at 4.30 a.m., before it was properly light; others followed at 4.45 a.m., and right on until 5.30 a.m. They feed on the plains on various seeds, a favourite food being the seed of the little wild melon, locally known as the “paddy melon,” and which is reputed to cause blindness and paralysis in horses. After feeding for an hour or two the birds fly in to water, and then amuse themselves until it is time to go out to feed by snipping leaves and branchlets off the Gums, which litter the ground beneath, and if the trees, as they often do, grow beside a waterhole, they seriously pollute the water, the birds thus incurring the enmity of the owner of the water. Early in 1910 this happened to such an extent on a station near here, that a man was employed to trap or otherwise get rid of the birds. The young are easily reared, and make engaging pets. They are very docile, and learn to repeat many words and phrases very plainly.

“Several hundreds of young birds are taken every year by the bird-catchers, who sell them locally or send them to Adelaide, or even Melbourne. They are favourite pets here, and rightly so too, as they are more docile and tractable than any of the other Cockatoos, and talk quite as well. They have a decided crest, more marked than that of *Licmetis nasica*, but have not nearly so much red colouring about the head. In *L. nasica* this tinting of the bases of the feathers extends often to the upper tail-coverts, whereas in the bird under notice it is much paler, more of an orange, and confined to the lores and slightly to the feathers across the base of the culmen. The naked space round the eyes is never circular, but is extended downward where it widens out. This skin is in all young birds, and most old ones, of a leaden or slaty colour. I have, however, seen a few old birds in which it was quite white. Whether this was an age change, or due to an excessive secretion of powder down, I am not certain.”

From Melbourne, Victoria, Mr. G. A. Keartland writes me:—“The home of *Cacatua sanguinea* is in the northern half of the continent, and its range extends across from Broken Hill, in South-western New South Wales, on the east to near Geraldton on the west. These birds assemble in immense flocks, and when preparing to roost three or four trees are often covered with them. When feeding or resting on the ground several acres are sometimes rendered white by the flock. Owing to their fondness for swampy country, where they feed on bulbs, &c., it is almost impossible to find an adult bird with clean plumage. Although I shot a great many for culinary purposes, the only clean birds were the young ones, which depended on their parents for food. At the Fitzroy River, North-western Australia, the natives took several young Galahs from nests of these birds. I ascertained that the Galahs had prepared the nest, lined it with leaves, and commenced laying when *Cacatua sanguinea* drove them away, laid their eggs, and hatched and reared the mixed brood; I heard of the same thing happening at Broken Hill.

Some time ago I saw a large consignment of birds at Spencer-street Station, Melbourne, which differed much in size, and the larger birds seemed to have a little more red on them than the others."

From Broome Hill, South-western Australia, Mr. Tom Carter sends me the following notes:—" *Cacatua gymnopsis* is the commonest species of Cockatoo in North-western Australia, being seen in vast flocks about the end of October, when the young birds are fledged. I do not recollect having noted them further south than the Wooramel River, but in the White Gum trees lining the great river beds of the Gascoyne, Lyons and Ashburton Rivers, and all the tributaries and creeks of these rivers, they are very abundant, and apparently increasing in numbers, as the Aborigines, who formerly took great quantities of young birds from the nests to eat, do not trouble much about them now, as they are regularly employed and fed on the stations. At the Yardie Creek, and other deep gorges of the north-western Cape Ranges, many of these birds bred in security in fissures in the precipitous cliffs, there being no large timber there with hollow spouts. On parts of the coast near the Ashburton River, many of the large Red Mangrove trees, which contained hollow places, were used as nesting places. On the inland country, east of Point Cloates, which is quite destitute of any timber, I have seen eggs laid in the hollow broken tops of the large white-ant hills, which are there in thousands, from twelve to fifteen feet in height in some cases. The eggs are laid irrespective of its being a wet or dry season, from about the 25th August to the 22nd September, and the clutch is two or three. These birds are very hardy in captivity, easily tamed, and the majority, if taken young from the nest, talk very readily and well."

The eggs are usually three in number for a sitting, oval or elongated oval in form, pure white, the shell being close-grained, comparatively smooth, and the surface slightly lustrous; when examined with a lens numerous small pittings are revealed, which are otherwise invisible. A set of three taken by Dr. W. Macgillivray, at Yalcowinna Creek, thirty-five miles north of Broken Hill, South-western New South Wales, on the 9th September, 1907, measures:—Length (A) 1.55 × 1.19 inches; (B) 1.6 × 1.15 inches; (C) 1.65 × 1.19 inches. A set of three taken in the same locality on the 29th September, 1908, from a hollow in a Coolibah Gum, about twenty feet up, while in company with Mr. William McLennan, measures:—Length (A) 1.62 × 1.14 inches; (B) 1.58 × 1.11 inches; (C) 1.74 × 1.12 inches.

Young birds resemble the adults, but have only the lores stained with red, and no rosy bases to the feathers of the head.

August to October constitutes the usual breeding season in North-western Australia and Western New South Wales. In Northern Australia it is usually in the early part of the year, February to May.

Cacatua roseicapilla.

ROSE-BREADED COCKATOO.

Cacatua roseicapilla, Vieill., Nouv. Dict. d'Hist., tom. XVII., p. 12 (1817); Gould, Handbk. Bds.

Austr., Vol. II., p. 8 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 132 (1891); Sharpe,

Hand-l. Bds., Vol. II., p. 11 (1900); Salvad., Ibis, 1906, p. 131.

Cacatua ros, Gould, Bds. Austr., fol. Vol. V., pl. 4 (1848).

ADULT MALE.—*General colour above greyish-brown, passing into pale greyish-white on the rump and upper tail-coverts; wings like the back, and becoming a darker brown towards the tips of the quills, the outer series of the median and greater wing-coverts greyish-white; tail-feathers grey, browner around their tips; crown of the head rosy-white, the basal portion of the feathers rosy-red, the lores and forehead washed with rosy-red; a collar on the hind-neck, sides of the neck, chin, cheeks*

and all the under surface rich rosy-red ; lower flanks and under tail-coverts grey. bill greyish-white, paler at the tip ; naked skin around the eye dull red ; legs and feet dark mealy-grey ; iris dull orange-red. Total length in the flesh 14 inches, wing 10 2, tail 5 6, bill 1, tarsus 0 88.

ADULT FEMALE.—Similar in plumage to the male.

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, South Australia, Western Australia.

IF we except the south-western and north-eastern portions of the continent, the range of the Rose-breasted Cockatoo, or, as it is usually called, the "Galah," extends over most parts of the inland districts of Australia. In Eastern Australia it is essentially a bird of the inland plains, with belts of timber thereon and trees fringing the river banks, and never so far as my experience goes does it occur near the coast. Like Gould I met with this species on the Namoi River, in Northern New South Wales, and later on about eighty miles to the north, on the Mehi River, where specimens were obtained ; and again in considerable numbers on the Castlereagh River, near Coonamble, in Western New South Wales. Gould remarks :—"A difference, however, which may hereafter prove to be specific, exists between the birds from New South Wales and those of the north coast. Those from the latter locality are the largest in size, and have the bare skin round the eye more extended ; and the rosy colour of the breast and the grey colouring of the back are darker than in the specimens I killed on the Namoi." I find just the reverse in the specimens in the Australian Museum Collection, as all the deepest rosy-red birds were obtained by the late Mr. K. H. Bennett, in South-western New South Wales. There is, however, as Gould points out, a variation in the depths of colour of the under parts, as there is also in size, even when procured in the same locality. One of the smallest and richest coloured birds in the Australian Museum is an adult female, obtained by Mr. W. Adams, who accompanied the late Mr. K. H. Bennett, at Moolah, Western New South Wales. The wing measurement of adult males varies from 9 8 to 10 75 inches. Specimens from Derby, North-western Australia, have that faded and washed-out appearance common to many species procured in torrid districts. Of abnormally plumaged individuals is an adult specimen presented by Mr. J. L. O'Donahoo, of Broken Hill, South-western New South Wales, which has the back, wings, tail, and under-tail coverts pure white, the head rosy-white, the hind-neck and all the under surface rich rosy-red. There is a variation in the colour of the iris in the adults. I have examined cages of these birds containing upwards of a hundred and fifty or more, and have noted most had the iris orange-red, others, apparently adult, with it black, and in one or two instances hazel ; it is not a sexual distinction. Young birds have the iris black.

As a rule the Rose-breasted Cockatoo may usually be seen feeding on the ground, the stomachs of those examined containing various seeds of herbaceous plants and portions of small bulbous-rooted plants. Near Coonamble these birds were very destructive in the grain fields, when the wheat was cut and set up in sheaves, as also were *Calopsittacus nove-hollandiæ* and *Barnardius barnardi*.

When procured from the nesting-place young birds soon learn to become proficient talkers. Two of these birds in particular that I know of seemed to possess almost human intelligence in their apt replies to questions, including even the inflections of voice, and were remarkable also for their versatility. Although one may find now and again an extraordinary good talker in a Rose-breasted Cockatoo, as a rule I regard *Licmetis nasica* and *Cacatua sanguinea* as having the most distinct and human-like enunciations. As a cage bird the former is the lowest priced among the Cockatoos, probably on account of their being so common and easily procured. At Junee Junction Railway Station, in Southern New South Wales, I saw hundreds of young birds that had been recently taken from the nesting-place, packed one on the other like fruit in open cases, and have seen them so received in the bird-dealers' shops in Sydney.

Mr. W. H. Hargraves, Trustee of the Australian Museum, has kindly given me the following note:—"In the early part of the year 1878 I sent a young Galah (*Cacatua roseicapilla*) to my brother Edward John, who resided at Noraville, Bungaree Norah. I subsequently, about a year after the above date, paid a visit to Noraville. My brother then informed me that the Galah had escaped from his cage about a week before my arrival. A few days after this, we were out on the run on horseback, and when returning to the homestead our attention was drawn to a Hawk pursuing a bird high up in the sky. My brother exclaimed "That is my Galah, I know his cry." He then whistled. The bird answered, and descending quickly lighted on his shoulder, where he remained until we reached home, and as soon as he saw his cage he made direct for it. He was very hungry, and appeared well satisfied to return to his old quarters."

The late Mr. K. H. Bennett wrote:—"I found *Cacatua roseicapilla* very plentiful near the Lachlan River, in Southern New South Wales, and about the sandhills for some thirty miles out on the northern side. They were in large flocks of some hundreds in number, feeding upon the seeds of a small plant, probably an annual, as all traces of the plant itself had disappeared. Just before sunset they congregate in the tops of the Pine trees (*Callitris*, sp.) to roost, and their bright coloured breasts gave one the idea that the tree was crowned with large rose-red blossoms. This species breeds during October and November, depositing four or five eggs in a hollow or trunk of some Eucalypt."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray writes me:—" *Cacatua roseicapilla* is to be seen throughout the district, but is not found breeding along the creeks in such numbers as *C. sanguinea*. They assemble in large flocks after the breeding season and gradually begin to pair off in July. They are earlier to nest than *C. sanguinea*, their eggs being often taken at the beginning of August. They choose for this purpose the hollows in the creek Gums, at a height which averages twenty to thirty feet, the eggs being placed at a depth of from one to three feet. The eggs are four or five in number, and repose on a bed of green Gum leaves in every instance. This is the only Cockatoo, or indeed member of the Order, that I know of which lines its nesting hollow, and the same material was used in every nest which I have examined both here and when I was a boy in Queensland. When watering these birds love to drink clinging to a post or fence or dead tree in the water; sometimes a whole crowd of them will alight on a post, and then a great screaming and flapping of wings ensues as each tries to get a position near the water. I have seen a partly submerged post and wire fence covered with Galahs in this way, the edge of the water in the foreground being at the same time white with *C. sanguinea*."

"Around our camp on Cawndilla Creek, near Menindie, during the first week in September, 1908, we found *Cacatua roseicapilla* in numbers, nearly all paired off, and each pair intent upon finding a suitable nesting-hollow, and when found in fitting in a bed of green Gum leaves as a resting place for their eggs; this bed varies in thickness from six inches to a foot, or even more. When hollows were getting scarce one pair was found to have essayed the impossible task of filling a hollow tree from the butt upwards, and had put in over two feet of leaves before giving it up. We frequently watched the birds nipping off the leaves, usually small branchlets bearing four or five leaves, and carrying them in their bills to the hollow, both birds helping in the task. Many were the disputes and altercations over hollows within sight of our tent door, both between different pairs of Galahs and between Galahs and other Cockatoos. A pair of Sulphur Crests had taken possession of one hollow, and were treated with the greatest respect; not so a pair of Blood-stained Cockatoos, whose chosen home was frequently occupied by Galahs during their absence, but usurpers were always ejected on the rightful owners return from their feeding grounds. On the creeks, owing to droughty conditions, Galahs were not so plentiful, nor were the clutches so full as they are when feed is more plentiful, many of them containing only two

eggs when it is usual to find three or four. The young when hatched are covered with pink down, and do not open their eyes for several days after. Both Galahs and Blood-stained Cockatoos have become very fond of the seeds of the domestic pie melon, which has run wild all over this district. They have no doubt been led to this by their fondness for the seeds of the small wild melon, and the scarcity of any other food."

From the Lands Office, Orange, New South Wales, Mr. W. M. Thomas wrote:—"A singular action of the Galah (*Cacatua roseicapilla*) that I have frequently noted on the Gunningbar Creek and the Macquarie and Castlereagh Rivers, is that it removes the bark from a patch on the trunk of the tree in a hollow of which it has its nest. This removal was always commenced on the south-east side of the tree: in some instances it extended right round the barrel, but always the larger area of removal was on the south-east side. In one case I noted that the bark had been removed for three or four years in succession, the removal patch being increased every year. I failed to discover any reason for this action."

Mr. G. A. Keartland sends me the following note from Melbourne, Victoria:—" *Cacatua roseicapilla* is the most widely dispersed species of the family CACATUIDÆ. It is found from within ten miles of Melbourne to the extreme north of the continent, and from the east to west coast. Unlike most of the PSITTACIDÆ they line their nests with freshly gathered Eucalyptus leaves, and I have often found their selected tree by following the bird with a leafy twig in its bill. They are ground feeders, and live principally on seeds, bulbs, &c., which they find amongst the grass. During the winter they congregate in large flocks, but in the spring are found in pairs. They make capital pets, and when taken young the males soon learn to articulate short sentences and perform tricks. During my travels in Western and North-western Australia with the Calvert Exploring Expedition, I often shot Galahs for the cook, and we made many good meals off them, as they can be eaten more often with a relish than any other game I tried."

From Broome Hill, South-western Australia, Mr. Tom Carter writes me as follows:—"The Rose-breasted Cockatoo was fairly common in the Gascoyne and Ashburton districts, and I have noted the birds at Mingeven, a considerable distance south of Geraldton. A flock of them perched in the limbs of a flowering White Gum tree is one of the most beautiful sights to be seen in the bush. A pair were observed clearing out a nesting hole as early as May, although the breeding season is in September. Mulga and Gidgea timber are the usual nesting sites, not White Gum."

For the purposes of breeding any suitable hollow in a tree is selected, either low or high, all the rotten wood is bitten off and cleared away, as is also the bark around the entrance, and the bottom of the cavity is lined with green Gum leaves, the same nesting-place being resorted to year after year. This habit of gnawing away the bark around the entrance hole, renders the nesting-place readily found. When in the Coonamble District, *Cacatua roseicapilla*, I was informed, always started to bite off the bark on the south-eastern side of a trunk, and as moss or lichen grow only on the south side of a tree, the latter is an infallible guide to one lost in the bush.

The eggs are usually four, sometimes five, in number for a sitting, and vary considerably in shape and size, occasionally even in the same set; oval to thick and elongate oval are most frequently found, and thick ovals with a very pointed smaller end are not uncommon; they are pure white, and are usually free from the usual nest stains so common in the eggs of the different species of Australian *Psittaci*, owing to the thick bedding of Eucalyptus leaves on which they are laid. Typically they are comparatively smooth-shelled, with minute shallow pittings on the surface when examined with the lens, and are as a rule lustrous. A set of four taken by Mr. S. Robinson on Buckiinguy Station, on the Macquarie River, New South Wales, on the 16th September, 1896, measures:—Length (A) 1.43 × 1.08 inches; (B) 1.38 × 1.07 inches; (C) 1.45 × 1.08 inches; (D) 1.49 × 1 inches. Another set of four taken on the same date and in the same

locality, measures:—Length (A) 1.32 × 1.06 inches; (B) 1.34 × 1.02 inches; (C) 1.37 × 1.07 inches; (D) 1.37 × 1.03 inches. A set of four taken by Dr. W. Macgillivray at Yalcowinna Creek, Broken Hill, South-western New South Wales, on the 9th September, 1907, measures:—Length (A) 1.47 × 1.08 inches; (B) 1.46 × 1.09 inches; (C) 1.4 × 1.03 inches; (D) 1.42 × 1.08 inches.

Young birds have the exposed portion of the feathers of the head and breast grey like the back, their bases dull rosy-red. Wing 8.5 inches.

In Eastern Australia September and October constitute the normal breeding season. I have seen numbers of young birds in Sydney bird-dealers shops as early as the 7th October, but on the 1st July, 1896, I noted young birds exposed for sale in baskets in George-street, Sydney, recently taken from the nesting-places, and also young *Calopsittacus nova-hollandiae* and *Barnardi* *barnardi*. Mr. G. A. Kearland observed these birds nesting on the Fitzroy River, in North-western Australia in February and March, 1897.

Genus LICMETIS, *Wagler*.

Licmetis nasica.

LONG-BILLED COCKATOO.

Psittacus nasicus, Temm., Trans. Linn. Soc., Vol. XIII., p. 115 (1819).

Licmetis nasicus, Gould, Bds. Austr., fol. Vol. V., pl. 5 (1848).

Licmetis tenuirostris Gould, Handbk. Bds. Austr., Vol. II., p. 11 (1865).

Licmetis nasica, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 133 (1891); Sharpe, Handl. Bds., Vol. II., p. 11 (1900).

ADULT MALE.—*General plumage white; lores and a frontal band scarlet; feathers of the periphthalmic region dull scarlet, all with the exception of the anterior portion with a slight yellowish wash, which extends on to the ear-coverts; bases of the remainder of the feathers of the head, the hind-neck, upper back, throat and breast scarlet, becoming paler on the upper back and lower portion of the breast; under surface of the quills and tail-feathers sulphur-yellow; bill horn colour; legs and feet bluish-grey; iris black. Total length in the flesh 15.75 inches, wing 10.8, tail 5.5, bill 1.7, tarsus 0.95.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution—Queensland, New South Wales, Victoria, South Australia.

THE Long-billed Cockatoo, or "Corella" as it is more frequently called, is an inhabitant of the south-eastern portion of the continent. In New South Wales it is found principally in the western portion of the State, and does not occur near the coast. It breeds in August and September, and young birds used to be seen exposed for sale in the streets of Sydney in October. It is in great demand as a talker, and commands a high price among the "White" Cockatoos of Australia. Formerly, in 1890 and thereabouts, fledgelings could be purchased at seven shillings and sixpence each, but from inquiries made at a bird-dealer's shop in George-street in October, 1909, the price had then advanced to ten shillings each for a young one that had to be hand-fed, and fifteen shillings each for one that could feed itself. Inquiries made elicited the fact also, that from Victoria and New South Wales combined, four hundred young ones had been received by that bird-dealer during the season, and that supplies were not so free in coming forward as years went on. In addition to its clear enunciation, this species lives to a good old age in confinement.

The following notes were made by the late Mr. K. H. Bennett:—" *Licmetis nasica* is only to be met with in the vicinity of permanent water, and is never, so far as my observations extend,

found in the dry back country. I have met with it frequently along the course of the Lachlan and Murrumbidgee Rivers, and I have seen immense flocks feeding on the plains a few miles distant from the latter river. On the approach of evening they leave their feeding ground and take up their quarters for the night in the thick fringe of heavy timber along the river, presenting a most animated and interesting scene. Hundreds of the birds dash here and there with rapid flight through the trees, their white plumage contrasting strongly with the heavy dark green fringe of the towering Eucalypts, and thrown into stronger relief by the rays of the setting sun. In some of the trees the birds might be observed clinging in all kinds of attitudes, or jumping nimbly from branch to branch, whilst in other places numbers were clinging head downwards at the extreme ends of the branches, the whole flock meanwhile keeping up an incessant and almost deafening noise."

Dr. Henry Sinclair, of Sydney, write me as follows:—"Twenty-six years ago a bird-dealer made me a present of a Long-billed Cockatoo, or 'Corella,' who was then known to be more than ten years of age, and shortly after he gave me another, who was a little over three years old. Thus for twenty-six years I have had these two pets, and have found them a continued source of pleasure, and although the elder bird is now thirty-six years old, and the younger one nearly thirty, yet they are in such good plumage, and so lively and playful, one would think that they were young birds. They have been treated with kindness and affection, which they have repaid in many ways by showing the love they have for those that have been kind to them. The elder is imperious, tyrannical, loquacious and domineering over his younger mate, and is very jealous when anyone notices him; the latter does not speak so well, is coarser, and more clumsy in all he does. However, the elder is not a great linguist, but what he does say is in a most human voice, his great *forte* being mimicry. If anyone is sewing he holds his foot up and draws his bill back as if he were using a needle and thread; when the floor is scrubbed he scrubs the bottom of his cage; if he sees one with a pipe he will immediately strike a match for you on his cage, and in fact imitates nearly everything that is done about the house. These two birds are hardy and rarely ever ill, and eat chiefly cracked corn, and are fond of raw potatoes and fruit. They are let out frequently to roam about the yard, and thoroughly enjoy themselves. To sum up my experience and observation of birds of this species, I would say they are noisy and require careful training to make them nice pets, but if they are obtained from the nest one will find they will become good talkers, clever mimics, lively and very loving birds."

Mr. G. A. Keartland sent me the following note from Melbourne, Victoria:—" *Licmetis nasica* lives almost exclusively on a small yam which it digs up with its long bill. Of course such a vast amount of digging must wear the upper mandible very rapidly, but this is compensated for by the rapidity of its growth. An old pet bird tried to lever a brick out of a drain with its bill, and split the upper portion from near the point to the base. I mended the break, and in three weeks the split portion had grown down to the point, and before the end of the following week no trace of the injury was visible. It is remarkable that when portions of Riverina near the Murrumbidgee River were used as cattle stations, these birds bred there in hundreds, but during the past thirty-five years the cattle have been replaced by sheep, and the Long-billed Cockatoos have deserted the vicinity so completely that a youth from that district could not be persuaded that the Corellas had ever been found there."

While resident in Hamilton, Victoria, Dr. W. Macgillivray sent me the following notes:—"The Long-billed Cockatoos (*Licmetis nasica*) nearly all nest about the same time, and are very regular in doing so; every year during the last week in August two fresh eggs are usually to be found in most of the nests, but sometimes three are laid. The long upper bill of the Corella (*L. nasica*) seems to be chiefly of service to root up the ground in search of food, at the present day freshly planted wheat or oats, but no doubt in days gone by it fed on native roots and bulbs, now completely exterminated by sheep."

Dr. Walter E. Roth, late Northern Protector of Aborigines, Queensland, thus refers to the mode of capture of several species of Cockatoos by the natives:—"Corellas (*Licmetis nasica*), Galahs (*Cacatua roseicapilla*) and White Cockatoos (*Cacatua galerita*) are entrapped on the water in the late afternoon in the Upper Georgina River District. The hunter, after tying numerous grasses, twigs and leafy boughs round his head, neck and face, which are thus completely concealed, will swim out to some log or snag projecting just out of the water, on which, he has learnt by previous observation, these birds have been accustomed to alight; here he supports himself with only his head above the surface. As the birds come down to drink they fly around the bushes, and resting on the log are easily caught by the legs, pulled under the water, their necks wrung, and stuck one after another in the hunter's waist belt. Another and very common method throughout the North-western Districts of catching these and other birds which fly in mobs, is to throw a light boomerang into their very midst when on the wing. On the Lower Tully River the capture of the White Cockatoo is somewhat of a difficult undertaking, but is mastered as follows:—Having noticed the particular branch and tree on which these birds are wont to camp, the natives will, during the day time, climb the tree and fix a lawyer cane to the branch in question: the cane is of such length that it reaches to the ground. At night he will climb it hand over hand fashion, fixing his feet as he progresses by grasping with the big and second toes; at the same time he carries with him a long thin stick hanging down behind, and attached to a ring of lawyer cane round his forehead or neck. Having reached the branch singled out, he very steadily crawls along it, and sneaking up very carefully knocks the birds over with the stick. This method of capture is somewhat of a hazardous one for the hunter, but is commonly and successfully employed. Parrakeets and Cockatoos can also be caught with bird-lime."

For the purposes of breeding it usually chooses the most inaccessible hollows in trees as nesting sites.

The eggs are two or three in number for a sitting, oval in form, somewhat pointed at the smaller end, and dull white, the shell being close-grained, minutely pitted and slightly lustrous. A set of three measures:—Length (A) 1.45 × 1.12 inches; (B) 1.44 × 1.13 inches; (C) 1.46 × 1.13 inches. A set of two in the Australian Museum Collection, taken by Mr. E. L. Ramsay in November, 1887, at Wattagoona Station, midway between Louth and Cobar, measures:—Length (A) 1.47 × 1.15 inches; (B) 1.5 × 1.14 inches.

When fully fledged young birds are indistinguishable, except from their slightly smaller size, from the adults. Wing 9.9 inches.

The normal breeding season commences in August and continues until the end of November.

Licmetis pastinator.

WESTERN LONG-BILLED COCKATOO.

Licmetis pastinator, Gould, Proc. Zool. Soc., 1840, p. 175; *id.*, Handbk. Bds. Austr., Vol. II., p. 12 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 134 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 11 (1900).

ADULT MALE.—*Like the adult male of LICMETIS NASICA, but larger: the lores, base of the feathers of the head, hind-neck and throat salmon coloured; the inner webs of the quills and tail-feathers, except the central pair, rich sulphur-yellow. Total length 18.5 inches, wing 12.5, tail 7.1, bill 1.9, tarsus 1.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution—Western Australia.

GOULD, who described this species, remarks in his "Handbook to the Birds of Australia:" "All ornithologists now admit that there are two species of the genus *Licmetis*, one inhabiting the western and the other the eastern portions of Australia. Living examples of both have been for some time in the Menagerie of the Zoological Society of London, where their differences are far more apparent than in the skins which have from time to time been sent to this country."

Licmetis fastinator is undoubtedly a good and distinct species, and even in dried skins the specific characters are apparent. Its larger size, paler and more circumscribed colouring of the head, hind-neck and throat, which does not extend on to the breast, and the rich sulphur-yellow of the inner webs of the quills and most of the tail-feathers will readily serve to distinguish it from the eastern species, *Licmetis nasica*. The specimens in the Australian Museum Collection were obtained by Mr. George Masters at King George's Sound in 1886, and at Mongup, Salt River, Western Australia, in 1868.

Mr. Edwin Ashby wrote me:—"I obtained a specimen of *Caatua fastinator* near Broome Hill, Western Australia, killed with poisoned wheat in a corn-field, in June 1889."

Mr. G. A. Keartland has sent me the following note:—"A friend of mine in March, 1895, was at King George's Sound, Western Australia, and in the back country found *Licmetis fastinator* breeding. He examined one nesting place he had observed a bird leave inside a spout of a hollow gum tree, and found one egg laying on the rotten wood, and as he had chopped such a hole in the limb that the bird was not likely to return to it, he took the egg. Afterwards he found two more nesting places, and each contained a young bird. He brought one of them to Melbourne, Victoria, also the egg, which I send you for description."

The above egg is oval in form, dull white, although the shell has a slight lustre. When examined under a lens numerous pittings are discernible all over the surface. It measures:—Length 1.7 × 1.27 inches.

Sub-family CALOPSITTACINÆ.

Genus CALOPSITTACUS, Lesson.

Calopsittacus novæ-hollandiæ.

COCKATOO-PARRAKEET.

Psittacus novæ-hollandiæ, Gmel., Syst. Nat., tom. I., p. 328 (1788).

Nymphicus novæ-hollandiæ, Gould, Bds. Austr., fol. Vol. V., pl. 45 (1848).

Calopsitta novæ-hollandiæ, Gould, Handbk. Bds. Austr., Vol. II., p. 84 (1865).

Calopsittacus novæ-hollandiæ, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 135 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 11 (1900); Salvad., Ibis 1905, p. 131.

ADULT MALE.—*Nape, hind-neck, scapulars and back dark greyish-brown, passing into grey on the rump and upper tail-coverts; wings dark grey, blackish towards the tips of the quills, the primary coverts darker, almost black; the outer series of the median and greater wing-coverts white, forming an oblong patch down the centre of the wing; central pair of tail-feathers grey, the remainder blackish-brown, the next pair on either side to the central ones greyish on their outer webs; forehead, basal portion of crest feathers, cheeks and throat lemon-yellow; ear-coverts orange-red; forehead, all the under surface and under tail-coverts greyish-brown; bill grey; legs and feet dark grey; iris brown. Total length in the flesh 12.5 inches, wing 6.5, tail 6.75, bill 0.7, tarsus 0.6.*

* Gould, Handbk. Bds. Austr., Vol. II., p. 12 (1865).

ADULT FEMALE.—*Resembles the male, but is duller in plumage; head and crest brown washed with yellow, except on the apical portion of the latter; ear-coverts dull orange-red; lower back, rump, and upper tail-coverts grey, with narrow transverse yellowish-white bands; central pair of tail-feathers similar, but the cross-bands more irregular and almost pure white, the next pair on either side blackish-brown washed with grey on their outer webs and crossed with irregular, broken, yellowish bands, the yellow increasing in extent towards the outermost feather on either side, which has the outer web yellow and the inner one banded and freckled with black, except at the tip; the inner webs of quills with four or five yellowish-white spots or bars, smaller on the outer ones; lower portion of the abdomen dull greyish-brown crossed with yellowish bars, the under tail-coverts distinctly darker, especially on the longer ones, and with similar yellowish cross-bars.*

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria. South Australia, Central Australia, Western Australia.

THE well-known Cockatoo, or New Holland Parrakeet, the “Cockateel” of aviculturists, and the “Quarrion” of country residents, is distributed over the greater portion of the Australian continent, and is an inhabitant at one season or another of all the States. It is needless to recapitulate here the numerous collectors, or observers, who have recorded it in different parts of the continent, but with the exception of North-eastern Queensland, the seaboard of New South Wales and South-eastern Victoria, it occurs nearly everywhere.

I met with this species on the Namoi River in considerable numbers in November, 1896, and on the Mehi and Gwydir Rivers in November, 1897, and many were obtained when coming to drink, for they are nearly always to be found in the vicinity of water. At Coonamble, and Woodside, sixteen miles to the north, near the Castlereagh River, they were again common in November, 1905, and although nesting at the time small flocks could always be found feasting on the wheat when stacked, usually upright in sheaves, and many birds were shot therefrom. Ample opportunities were afforded of watching the male relieve the female in the duties of incubation by a pair of birds breeding in a large hollow spout of a Gum tree close to the verandah, both birds after they had fed and had drunk at a tank close by returned to the tree, one entering the hollow and the other sitting on the tree enlivening its mate with its low but almost incessant warbling note. They are in great request as cage birds, many being exported annually to Europe and elsewhere. If procured young they soon become proficient whistlers and talkers, and they breed freely in an aviary if provided with the means of doing so—a hollow log. In Western Australia Mr. Carter records them breeding from July to September; in Eastern Australia it is usually a month or more later, although I have noted young birds exposed for sale in the streets of Sydney, recently taken from their nesting-place, on the 1st July. On the 9th August, 1909, I saw young *Cacatua roseicapilla*, *Calopsittacus nova-hollandiæ* and *Platyercus eximius* in a basket being offered for sale at the Australian Museum gates. Young Cockatoo-Parrakeets, recently taken from their nesting-places, were also common in the Sydney Markets during March, 1911. They bear confinement remarkably well, and soon become apt whistlers. One of these birds left in our possession for some time would whistle in a continuous strain for ten or more minutes. When first we heard it, we thought it proceeded from some boy in the street, but found afterwards that he used to hear his mistress sing about the house, and he imitated her notes. During the time the melody lasted it would be accompanied with a swaying of the body and turning of the head. At other times he would for an hour together utter his monotonous “wood-notes wild,” until we placed a mirror before him, when not a sound would be heard from him.

To Central and Southern New South Wales it is usually a migratory species, arriving in August or September, remaining to breed, and departing again about February. The time of its appearance is, however, greatly regulated by the season; after a period of drought it has been known to breed in May and June.

Stomachs of these birds examined contained the seeds of various grasses and herbaceous plants, and grain of different kinds, and intermingled with these a few pieces of gravel.

The wing-measurement of adult males varies from 63 inches to 69 inches. Individual variation is not uncommon, especially in the colour of the hind-neck, back and scapulars of adult males, varying from greyish-brown to slaty and brownish-black, and there is one fine adult male in the Australian Museum Collection which has the white median coverts of the wing-patch externally edged with lemon-yellow.



TAKING THE EGGS OF A COCKATOO-PARRAKEET.

Mr. Thos. P. Austin, of Cobborah Station, Cobborah, New South Wales, writes me:— "*Calopsittacus novae-hollandiae* remains here according to the season, some years a few stay throughout the year, but as a rule it arrives about the end of August, and usually may be seen in flocks of from four to a dozen. They breed here in great numbers in the dead trees, in which they are rather difficult to see on account of their plumage, being much the same colour as the dead limbs. After the breeding season they return northward in February and March. During the hot weather they cannot go long without water, but always seem to be very much alarmed about remaining long at the edge of the water. When coming to drink they fly round a few times, then settle on a tree or fence near by, where they remain for some time before leaving to drink, which they do very quickly, and then fly away."

These birds were fairly common on Cobborah Station during a visit paid to Mr. Austin in October, 1909, but they were not nearly so numerous as I found them at Woodside, near Coonamble. Although it was the breeding season, several small flocks were seen about the run, and only one nesting-place was examined during my stay. It was low down in a limb of a small dead tree, about fifteen feet

from the ground, and on the 18th October Mr. Austin, from a hole cut in the limb, extracted four slightly incubated eggs, which were deposited as usual on the decaying wood. The accompanying block is reproduced from a photograph taken by me of this nesting-place.

Mr. R. Grant, Taxidermist, Australian Museum, has given me the following notes:—"I found the Cockatoo-Parrakeets plentiful at Narromine, New South Wales, in November, 1883. They were usually met with in pairs all along the Macquarie River, but sometimes in the early morning they would assemble in flocks of about thirty or forty, and when on the wing their

evolutions were carried out with such precision, it gave one the impression that each bird knew its place and kept a certain distance from its mate. They never flew very high, sometimes almost sweeping the ground, when they would give one of their graceful side turns, exhibiting their beautiful white shoulders, which were further relieved by the dark green foliage of a belt of pine trees in the near distance."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray sends me the following notes: "*Calopsittacus nove-hollandiæ* is not with us during the winter, but arrives irregularly in the spring, both as to time and the numbers in which they come. In 1903 and 1904 very few put in an appearance. In 1905 they were very numerous, arriving during the last week in September, and during the next two months nests were to be found at short intervals along all the creeks. In 1906 they arrived very early, being noted during the last week in July. Whereas Barnard's Parrakeet and the Many-coloured Grass Parrakeet usually choose a nesting hollow they can just squeeze into, the Cockatoo-Parrakeet almost invariably selects one commodious enough to admit a Cockatoo, or even a larger bird. I have found nests at all elevations, sometimes as low as two feet from the ground. The sexes take it in turn to sit on the eggs, differing in this again from the Many-coloured and Barnard's Parrakeet. Five eggs is the usual number, and these are placed on the decayed wood and earthy matter, usually found in nesting hollows. In the Cloncurry District, Northern Queensland, these birds occur at times in immense numbers, and nest during October and November, sometimes earlier."

Relative to a trip made by Dr. Macgillivray and Mr. W. McLennan in September, 1909, to the north of Broken Hill, the former wrote me:—"On our journey out along the creeks we met the advance guard of the southern flight of *Calopsittacus nove-hollandiæ* early in September; they became more plentiful as we proceeded north, pairs dropping off all along the route where suitable hollows for breeding purposes were met with. When we got to Wyallah Lake, one hundred miles north from Broken Hill, on 19th September, we found them breeding in the dead Box Trees and stumps standing in the water, the eggs being very often in the hollow almost at water level, but of course always dry. At that date there were very few complete sets of five, mostly ones and twos. Galahs were also taking advantage of the protection afforded by the water to breed in the same situation. Later in September, and early in October, we found *C. nove-hollandiæ* nests on Sleepswell and Yalcowinna Creeks containing newly hatched young, curious little objects; even at such an early age the crest is evident. They are hatched with eyes closed, which open in about four or five days, when some yellow down begins to show itself on the dorsal, femoral, and humeral pteryle. The parent birds commence to incubate as soon as the first egg is laid. A large hollow is nearly always chosen as a nesting-site."

From Melbourne Mr. G. A. Keartland sends me the following note:—"Although *Calopsittacus nove-hollandiæ* is more numerous in the northern half of Victoria, a few come as far south as the neighbourhood of Melbourne. During 1908 they bred at Preston and Croydon. The first place where I saw them, over forty years ago, was near Majorca, in the Maryborough District, Victoria, where they were breeding in the same trees as the Warbling Grass Parrakeets (*Melopsittacus undulatus*). They are very prolific, frequently laying as many as seven eggs, and I have seen several pairs of old birds with six or seven young ones. They breed readily in captivity. I placed a pair in an ordinary packing case, with a wire netting front, with a hollow log containing a handful of sawdust as a nesting-place. They reared three broods in the season, the hen laying soon after the young ones left the nest. They had two broods of five and one of four. The young ones are remarkable for the severity of their bite, even before they can fly, and make nice pets, and soon learn to talk and whistle. They thrive best on wheat, oats and canary seed, but are very fond of thistles."

From Tea-tree Gully, South Australia, Dr. W. A. Angove sent me the following note:—" *Calopsittacus nove-hollandiæ* is seldom to be seen in the ranges, but at Modbury, within eight

miles of Adelaide, and which is situated at the foot of the hills, the bird, though not abundant, is nearly always to be found. There is a permanent creek at Modbury, with large Red and Blue Gums on it, and the birds nest in the hollows and spouts of these trees, October being their nesting month and three to four eggs the usual clutch. I have never seen this bird abundant anywhere, though one seldom goes far along the Murray River without hearing and seeing them."

From Broome Hill, South-western Australia, Mr. Tom Carter writes me as follows:—" *Calopsittacus nova-hollandiæ* is fairly abundant in the north-west, and has been noted as far south as Kellerberrin. Unlike the larger Cockatoos, which seem to have a regular nesting time, irrespective of rains, this species breeds early or late, according to the season. Eggs have been taken from the 14th July to the 11th September. They make charming cage birds and breed in captivity."

The breeding place of the Cockatoo-Parrakeet is in a hole in a tree; those I saw on the Namoi and Castlereagh Rivers were from twenty to forty feet from the ground, but Dr. W. Macgillivray records finding them at all elevations.

Usually five eggs constitute a sitting, but Mr. Keartland records as many as seven being occasionally found. They vary in shape from oval and elongate-oval to a decided pyriform, the shell being close-grained, smooth and pure white, some being dull and lustreless, others slightly glossy. A set of five taken by Mr. S. Robinson at Harriman Park, South-western Queensland, on the 1st October, 1897, measures:—Length (A) 1.07 × 0.77 inches; (B) 0.93 × 0.78 inches; (C) 1.07 × 0.8 inches; (D) 1.03 × 0.78 inches; (E) 1.02 × 0.76 inches. A set of five taken from a large hollow in a Gum by Dr. W. Macgillivray on Yalcowinna Creek, near Yanko Glen, in South-western New South Wales, on the 11th August, 1906, and from which the male bird was flushed whilst sitting, measures:—Length (A) 1.08 × 1.82 inches; (B) 1.11 × 0.8 inches; (C) 1.05 × 1.81 inches; (D) 1.03 × 0.8 inches; (E) 1.04 × 0.81 inches. Another set of five taken by Mr. C. Carr on the 17th August, 1906, on Burrenbilla Station, near Cunnamulla, in South-western Queensland, measures:—Length (A) 1.03 × 0.78 inches; (B) 1.96 × 0.78 inches; (C) 1.02 × 0.78 inches; (D) 1.06 × 0.78 inches; (E) 1.07 × 0.77 inches.

Immature males resemble the adult females in having the lower back, upper tail-coverts, tail, lower abdomen and under tail-coverts transversely barred with yellowish-white or whitish-brown, but may be distinguished by the brighter yellow face and throat. Wing nearly equals that of the adult, 6.4 inches.

August and the four following months constitute the usual breeding season, but nests containing eggs or young may be found throughout the year. Mr. T. Carter found nesting-places containing eggs from July to September in Western Australia, but the breeding season there is entirely regulated by the rainfall.

Family PSITTACIDÆ.

Sub-family PALÆORNITHINÆ.

Genus POLYTELIS, *Wagler*.

Polytelis barrabandi.

BARRABAND'S PARRAKEET.

Psittacus barrabandi, Swains, Zool. Illustr., pl. 59 (1821).

Polytelis barrabandi, Gould, Bds. Austr., fol. Vol. V., pl. 15 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 31 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 478 (1891); Sharpe, Handl. Bds., Vol. II., p. 32 (1900).

ADULT MALE.—General colour above and below bright grass-green; occiput washed with bluish-green; front of the head, chin, cheeks and throat gamboge-yellow; below the throat a crescent of scarlet, the bases of these feathers gamboge-yellow, those next the chest yellow at the base, scarlet in the centre, grass-green at the tips; lores, orbital region and ear-coverts grass-green; primaries blue on their outer webs, strongly washed with grass-green, black on their inner webs; primary-coverts blue faintly tinged with grass-green; tail grass green, the central feathers shaded with blue near their shafts, and the lateral feathers washed with blue on their outer webs; under surface of the tail-feathers black, lighter at the tips; bill red; iris rich yellow; feet brown. Total length in the flesh 16 inches, wing 7.5, tail 9, bill 0.7, tarsus 0.6.

ADULT FEMALE.—Dull grass-green above and below; wings and tail as in the male, but having the inner webs of the primaries narrowly edged with yellowish-white, and the inner webs of the lateral tail-feathers broadly margined with rose and tipped with dull yellow; face and ear-coverts pale greenish-grey, the latter and the cheeks slightly washed with blue; margins of the feathers on the lower throat tinged with dull rose; thighs scarlet; under tail coverts yellowish-green.

Distribution—New South Wales, Victoria, South Australia.

ONLY two species of the genus *Polytelis* are known, *P. barrabandi* and *P. melanura*, and both are restricted to the southern portions of the Australian continent. They are elegant in form, and may be distinguished by their lengthened tail-feathers, the inner webs of the lateral ones of the adult male are uniform in colour, while those of the female are broadly margined with rose-pink. In New South Wales the present species gives undoubted preference to the vicinity of water, and is an inhabitant of the open forest country and lightly timbered plains in the neighbourhood of Wagga Wagga, Yass and Warrumbidgee, and extending through the Riverina District into Victoria and adjoining portions of South Australia. It is particularly numerous in the former locality, where I met with it in August and September of 1888, and where Mr. George Masters many years before procured a large series of specimens in company with the late Sir William Macleay. These specimens are now in the collection of the Macleay Museum at the University of Sydney. All the specimens in the Australian Museum Collection were procured in the central southern districts of New South Wales, and I have never seen it from any other part of the State. Writing of this species Gould remarks:—"When we know more of its history I expect it will be found to enjoy a similar range to the *P. melanura*, and that the two species as closely assimilate in their habits as they do in form." *Polytelis barrabandi*, however, is restricted to the south-eastern portion of the continent, while the range of *P. melanura* extends right across the southern portion from east to west.

Barraband's Parrakeet, or the "Green Leek" as it is more frequently called, is a showy and attractive species, bearing confinement well and breeding in captivity. The first specimen of this bird I saw was a fine old adult male shot from a flock at Tarnagulla, Victoria.

It passes most of its time on the ground, where it procures its food, which consists of the seeds of various grasses and herbaceous plants.

Individual variation in this species is not uncommon, one of the adult females in the Australian Museum Collection has some of the median upper wing-coverts yellow, and another one in the Mounted Exhibit Collection has some of the scapulars broadly tipped with dull yellow.

Mr. G. A. Keartland has kindly supplied me with the following notes:—"Being desirous of seeing *Polytelis barrabandi* in its home on the Murrumbidgee River, New South Wales, Messrs. T. and C. Brittlebank and I arranged to be driven to one of the river flats, where it frequently breeds, and from which the clutch of eggs in my cabinet was taken. The date of our visit was the 25th September, 1901. We found the male birds very numerous, in couples or in flocks of from six to ten, but only noticed two females, which we shot. That the females were all sitting was evident from the bare state of the breasts of those secured. The male birds do not sit, but

gather grass seed and also honey from the box trees, which were in blossom, and then go to the nests and feed their mates. The amount of honey collected by these birds must be very great, as a stream a yard long frequently hung from the mouths of those killed when held head downwards. Their nests were invariably in the hollow branches of the largest trees they can find, and none but the most daring climber can secure their eggs. Mr. Ernest Williams informed me that of fourteen nests he examined in 1900, each contained six eggs when incubation commenced. Where a less number was found they were all fresh, and afterwards six young birds were taken from the hollows, thus showing that the number of eggs is invariably six. Of all the Australian Parrakeets I consider the Green Leek (*Polytelis barrabandi*) the most beautiful and attractive as a cage pet. They not only learn to articulate words distinctly, but are very gentle if taken young, and will submit to be stroked without resistance or attempting to escape. Until six months old the young ones are all alike in their uniform green plumage with pink inner webs to the tail feathers and a little scarlet on the legs. At ten months the males have a considerable portion of the forehead and face yellow, and at sixteen months the forehead, face and throat are all a rich yellow with a brilliant scarlet crescent dividing the lower margin of the yellow from the green on the breast. The females retain the pink markings on the tail-feathers, and in other respects undergo very slight alteration in their plumage, thus rendering it difficult to distinguish between an adult female and a young bird of either sex.

“Mr. E. Williams found *Polytelis barrabandi* breeding in the hollow spouts of the Gum trees on the banks of the Murrumbidgee River, near Wagga Wagga, New South Wales, on the 2nd October, 1899. On striking the trunk of a tree with a tomahawk, a pair of birds were seen to leave a hollow spout, which was about forty feet high. The eggs, six in number, were found on the decayed wood about fifteen inches from the opening, and were slightly incubated. There were three nesting-places of this Parrakeet in the same tree, each containing six eggs, but only one set was taken, as Mr. Williams wished to get the young ones. Altogether he found that season six nests with eggs or young.

“These beautiful Parrakeets are seldom seen very far from water. Along the course of the Murray and Murrumbidgee Rivers they frequent the large timber, being very partial to the blossom of the Yellow Box, which is plentiful in that neighbourhood, and they breed in the hollow spouts of the tallest trees. During the breeding season, whilst the females are sitting, the males congregate in flocks, and from a dozen to twenty may often be seen together, hence the erroneous idea that the sexes are alike in plumage. The males acquire full plumage when from sixteen to eighteen months old, but females I have kept for nine years have undergone no change. Several times during the day the males visit the nests to feed the females or young, but I have never known them to take part in the work of incubation. I have kept a number of them in captivity, and they make excellent pets. They are very gentle, bear handling without biting, and talk well. In 1908 my birds laid, and the female sat on four eggs, but unfortunately the mice disturbed them at night, and ultimately destroyed the eggs.”

Mr. Percy Peir, of Marrickville, near Sydney, has kindly forwarded me the following notes :—
 “At Grong Grong, New South Wales, I have seen Barraband's Parrakeet or ‘Green Leek’ (*Polytelis barrabandi*), in small flocks of a dozen or more, alight in the growing wheat, of which they devour a considerable quantity. These birds are rather rare, and were never to be purchased at any time in any great quantity, and of late years have been practically unknown in the Sydney bird-dealer's shops. They are one of our most beautiful Parrakeets, and the most difficult of any to cage off from the wild state. Sunflower seed and outs were the most successful foods I could get them to take, and since the discovery of this I have never lost a bird. One now in confinement for over six years has a scarlet band, at its widest part about an inch and a half, and the frontal patch a deep orange-yellow; each year its plumage appears to be more brilliant. They became very tame during cage life, but make no attempt to breed.”

A set of six eggs in Mr. G. A. Keartland's collection, taken by Mr. Ernest Williams on the Murrumbidgee River, near Wagga Wagga, New South Wales, on the 2nd October, 1899, are nearly round in form, the shell being close-grained, white, lustreless and nest-stained. They measure:—Length (A) 1.1 × 0.95 inches; (B) 1.12 × 0.95 inches; (C) 1.2 × 0.95 inches; (D) 1.15 × 0.95 inches; (E) 1.1 × 0.93 inches; (F) 1.07 × 0.91 inches.

The last trace of immaturity in the almost adult male is exhibited in the dull scarlet bases of the feathers on the thighs.

October and the three following months constituted the usual breeding season in New South Wales.

Polytelis melanura.

BLACK-TAILED PARRAKEET.

Palaeornis melanurus, Vig., in Lear's Ill. Parr., pl. 28 (1832).

Polytelis melanura, Gould, Bds. Austr., fol. Vol. pl. 16 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 33 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 179 (1891); North, Ibis, 1894, p. 260; Sharpe, Hand-l. Bds., Vol. II., p. 32 (1900).

ADULT MALE.—*General colour above and below jonquil-yellow: head, nape and upper tail-coverts washed with olive; inter-scapular region olive; scapulars blackish, olive in the centre and on the inner webs of the feathers; primaries and secondaries black, dark blue on their outer webs, the apical half of the outer primaries washed with bluish-green; outer webs of the innermost secondaries pale salmon-red; greater wing-coverts black, the centre webs of the outer series dark blue, the median series washed with green, in very old birds jonquil-yellow, and tinged with dull crimson, the innermost series crimson margined with jonquil-yellow; median and lesser wing-coverts jonquil-yellow; tail black shaded with blue; under surface of the tail black, the lateral feathers narrowly edged with rose on their inner webs, and tipped with dull yellow tinged with rose; bill coral-red. Total length in the flesh 16 inches, wing 7.7, tail 9.4, bill 0.8, tarsus 0.7.*

ADULT FEMALE.—*Dull olive-green above and below, brighter on the rump, breast and abdomen; inner series of the lesser and median upper wing-coverts greenish-yellow; greater wing-coverts blue washed with olive-green, the outer webs of the inner series dull red towards the tips; quills blackish-brown, their outer webs dark blue externally washed with olive-yellow; the outer webs of the inner secondaries dull red near the tips, tail dull greenish-blue, inner webs of the lateral feathers black shaded with blue, those of the three outermost feathers broadly margined and tipped with rose-red, the next on either side narrowly edged with rose-red.*

Distribution—New South Wales, Victoria, South Australia, Western Australia.

RIGHT across the southern portion of the Australian continent, from east to west, extends the range of the present species. In the eastern portions of Australia the Black-tailed Parrakeet is more familiarly known under the name of "Rock Pebble;" and "Smoker," the latter probably derived from the dusky-coloured plumage of the female. In the western portions of the continent it is popularly known as the "Mountain Parrot" and the "Marlock Parrakeet."

The distribution of the present species in Eastern Australia is somewhat similar to that of Barraband's Parrakeet. In New South Wales it is comparatively rare, even where it occurs, principally along the banks of the Murray River, in the south-western portions of the State, ranging chiefly into the Wimmera District in Victoria, and frequenting similar country in the adjoining portion of South Australia. Judging by collections examined, it does not appear to be

widely distributed over the remainder of South Australia, and neither Dr. W. A. Angove or Mr. Edwin Ashby refer to it in their notes from that State, but the latter obtained a specimen at Eticup, Western Australia, in June 1899. Collecting on behalf of the Trustees of the Australian Museum, Mr. George Masters also procured a fine series at Mongup, Salt River, in January 1869.

The late Mr. K. H. Bennett, of Yandembah Station, near Mossgiel, New South Wales, wrote:—"I have only on occasion seen *Polytelis melanura* in a state of nature. When camped on the banks of a large lagoon, near the confluence of the Lachlan and Murrumbidgee Rivers, New South Wales, my attention was attracted one excessively hot morning, just at sunrise, by the peculiar and to me unknown notes of some bird. On looking around I observed a flock of about twenty *Polytelis melanura*, in the act of alighting on the dead branches of a tree that had fallen into the lagoon, with the evident intention of obtaining a drink, of which they appeared much in need. I was just in time to see the direction from which these birds had come, which was from the north, and at that time there was no water for over one hundred miles in that direction."

From Blackwood, South Australia, Mr. Edwin Ashby wrote me:—"I obtained a specimen near Broome Hall, Eticup, Western Australia, in June, 1899, where it is locally known as the 'Marloch Parrakeet.'"

Writing on the 5th October, 1909, from Marrickville, Sydney, Mr. Percy Peir has sent me the following notes:—"The Black-tailed Parrakeet (*Polytelis melanura*) is generally known among bird fanciers as the 'Smoker,' and these birds are undoubtedly second to none as talkers, whistlers, etc. Birds now in my possession for some five years originally came over from Victoria as squeakers, the plumage at that time being a smoky-green colour, and it took about three years before they were in full colour, one male bird being a brilliant yellow on the head and breast, and each succeeding year the colour becomes brighter. Fed on Canary seed and oats they will live for a number of years; the critical part of their existence is prior to the annual moult, when they are liable to become 'light,' which generally ends disastrously. Bread dipped in milk should be supplied to all caged Parrakeets, and fewer deaths would be the result."

For an opportunity of examining the eggs of this species I was first indebted to Mr. W. White, of the Reed-beds, near Adelaide, who found this Parrakeet breeding in September, 1863, in the holes of the larger *Eucalypti* overhanging the banks of the Murray River, above the North-West Bend, near Pudnooka, in South Australia. While in Melbourne in March, 1899, Mr. Chas. French, Junr., informed me that in October, 1898, in company with Dr. Charles Ryan, they met with this species in the timber bordering Lake Wimmera, North-western Victoria. On this occasion, and again when Dr. Ryan visited the district in October, 1899, nesting-places were found in holes in Red Gum trees from fifteen to thirty feet from the ground.

The eggs are four to six in number for a sitting, and vary from an ellipse to a rounded oval in form, white, the shell being close-grained and smooth, but very minutely pitted and lustreless. Average specimens taken by Mr. W. White on the banks of the Murray River, near Pudnooka, South Australia, in September, 1863, measure:—Length (A) 1.2 × 1 inches; (B) 1.23 × 1 inches. A set of five taken in the Wimmera District of Victoria, on the 6th October, 1899, measures:—Length (A) 1.09 × 0.98 inches; (B) 1.22 × 0.96 inches; (C) 1.21 × 0.91 inches; (D) 1.23 × 0.96 inches; (E) 1.2 × 0.95 inches.

This species also breeds in confinement. A pair procured by Mr. White near Pudnooka nested during October, 1865, in a hollow limb of a tree placed in their aviary, successfully rearing three young ones from a set of four eggs.

September and the three following months constitute the usual breeding season. Mr. Masters procured immature males at Mongup, Salt Water, Western Australia, in January, 1869.

Genus SPATHOPTERUS, *North*.**Spathopterus alexandræ.**

QUEEN ALEXANDRA'S PARRAKEET.

Polytelus alexandrae, Gould, Proc. Zool. Soc., 1863, p. 232.

Polytelis alexandra, Gould, Handbk. Bds. Austr., Vol. II., p. 32 (1865); *id.*, Suppl. Bds. Austr., fol. Vol. pl. 62 (1869); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 479 (1891).

Spathopterus alexandra, North, Ibis, 1895, p. 339; Spencer, Narr. and Summ. Horn Sci. Exped. Centr. Austr., Part I., p.p. 100–146 (1896); North and Kearl., Rep. Horn Sci. Exped. Centr. Austr., Part II., pp. 60–63, pl. 5 (1896); *id.*, Trans. Roy. Soc. S.A., Vol. XXII., p. 130 (1898); Dubois, Nouv. Man. D'Orn., Vol. I., p. 20 (1899); Sharpe, Hand-l. Bds., Vol. II., p. 33 (1900); Seth Smith, Parrakeets, p. 124 (1903); Salvad., Ibis, 1907, p. 141.

ADULT MALE.—*Forehead, crown of the head and nape light blue; hind-neck, upper portion of the back, scapulars and innermost secondaries light olive-green, some of the feathers of the upper back indistinctly margined with green at the tips; lower back and rump blue; upper tail-coverts light olive-green; two central tail-feathers olive-green passing into a dull bluish-green towards the tips, their basal half narrowly edged with greenish-yellow, the rest on either side similar but having the basal half of their inner webs narrowly edged with rose-pink; the remainder pale bluish-grey on their outer webs, dusky bluish-grey on their inner webs next the shaft, broadly margined with rose-red and indistinctly tipped with greenish-yellow, which decreases in extent towards the central pair; upper wing-coverts yellowish-green; primary coverts indigo-blue, the outer ones nearly black; quills dark-brown, the innermost secondaries pale olive-green like the scapulars, the remainder green on their outer webs shaded with blue near the tips, and externally edged with greenish-yellow, the primaries similar but without the bluish shade, except on the outer series; feathers in front and beneath the eye dull yellowish-green; chin, cheeks and throat rose-pink, becoming much paler on the basal portion of the ear-coverts; remainder of the under surface pale olive-green with a slight ashy blue shade on the abdomen; thighs and crissum dull rosy-red; sides of flanks deep blue and lilac; under tail-coverts olive-green; under wing-coverts bright grass-green; bill coral-red, fleshy-white at the tip; legs and feet dark grey; iris rich orange. Total length in the flesh 11 inches, wing (including the spatulate tip to third primary) 7·8, central tail-feathers 11·5, outer tail-feathers 4, bill 0·7, tarsus 0·7.*

ADULT FEMALE.—*Similar in plumage to the male, but paler, especially on the crown of the head, lower back, rump and thighs; the primary coverts too are washed with green. Wing 6·8 inches.*

Distribution—South Australia, Central Australia, Western Australia, North-western Australia.

THE type of this species, the sole representative of the genus, was discovered by Mr. F. G. Waterhouse, a former Curator of the South Australian Museum, Adelaide, at Howell's Ponds, Central Australia, during Stuart's Trans-continental Expedition in 1862. Gould described it in the "Proceedings of the Zoological Society," in 1863, dedicating it to the then Princess of Wales, now the Dowager Queen, and subsequently figured it in his "Supplement to the Birds of Australia." The only original specimen now apparently in existence is one in the Australian Museum, received by Dr. E. P. Ramsay from the late Mr. F. G. Waterhouse. It is labelled, apparently by the latter, "*Polytelis alexandrae*, No. 3a, Howell's Ponds, S. Lat. 16° 54' 7", Stuart's Expedition," and in Dr. Ramsay's handwriting on the back "One of the type specimens."

After a lapse of twenty-eight years, Mr. M. S. Clarke, of Adelaide, South Australia, brought under the notice of the public, through the columns of the *South Australian Register* of the 28th

* Cat. Austr. Bds., Part III, PSITTACI, p. 44 (1891)

of August, 1890, the existence of two living birds in Adelaide, which had been taken from a nesting-place in a hollow branch of a tree by Mr. Alex. Magarey, at Crown Point, in Lat. 25 30' and Long. 133°, about six hundred miles south from where the types were obtained.

Later on Dr. E. C. Stirling, the Director of the South Australian Museum, Adelaide, who accompanied the Earl of Kintore, the then Governor of South Australia, on his trip across the continent from north to south, succeeded in shooting three of these Parrakeets at Newcastle Waters, and only about twenty miles from Howell's Ponds, where the type was obtained in 1862. One of these birds procured by Dr. Stirling, an adult male, was received in exchange by the Trustees of the Australian Museum, and is now in the Reference Collection.

In 1894, a fine series was collected by the members of the Horn Scientific Expedition, at Glen Edith, in Central Australia, and the preceding description is taken from one of them, a fine old male, the most highly coloured and perfect specimen I have ever seen. It is in the Reference Collection of the Australian Museum, and was presented with other specimens obtained by the Expedition, by Mr. W. A. Horn, through Professor W. Baldwin Spencer, of the University of Melbourne. Consequent upon an examination of these specimens, it was found necessary to institute the genus *SPATHOPTERUS* for the reception of this species. The end of the third primary of each wing of the adult male is singularly elongated, and terminates in a spatule, the wing of the adult female is normal, and destitute of these adornments. The



Terminal portion of wing of adult male *Spathopterus alexandrie* (natural size).

spatulate elongation extending from the third primary of the adult male of *Spathopterus alexandrie* will at once serve to distinguish it from any other Australian genus, and it more resembles that seen on the lower wing of the well known brilliant blue and black Queensland butterfly, *Papilio alysses*, Linn. From the genus *POLYTELLIS*, which it otherwise resembles, *SPATHOPTERUS* may also be further distinguished by both sexes having the inner webs of the lateral tail-feathers broadly mar-

gined with rose-red, while in *POLYTELLIS* the females alone have it. In 1866-7 Mr. G. A. Keartland again obtained specimens, while a member of the Calvert Exploring Expedition, in North-western Australia. Subsequently it was found breeding in Western Australia and South Australia, and living examples in captivity are now not the rarity they were a decade ago. Of those birds I have seen in confinement, next to their exceedingly delicate colouring what attracted me most was their extremely loud, shrill and penetrating notes. There is an adult male in perfect plumage in the Mounted Collection of the Australian Museum, presented to the Trustees by Mr. Anthony Hordern, of Retford Hall, Darling Point.

The food consists almost exclusively of small grass-seeds. Mr. F. Turner, to whom I submitted the contents of the crop of one of these birds for examination, has referred the seeds to the following species:—*Triodia mitchelli*, Benth., one of the Porcupine grasses; *Danthornia bipartita*, F. v. M., one of the Mulga grasses; and *Portulacca oleracea*, Linn., or 'Purslane.' The seeds of the latter plant Mr. Turner informs me were at one time used as an article of food by the Aborigines of the interior of Australia.

Mr. G. A. Keartland writes me as follows:—" *Spathopterus alexandrie* has a singular habit of lying along the stout limbs of a tree like a lizard, instead of perching on a twig or

* Ibis, 1895, p. 339.

thin branch. In Central Australia we only met with these birds on the 16th June, 1894, between Glen Edith and Deering Creek. The late Professor Ralph Tate informed me that he had seen a strange looking Parrakeet in some *Casuarina* near at hand, and after going about two hundred yards in the direction indicated, saw what appeared to me a *Calopsittacus nova-hollandiæ* flying towards me, and which alighted on the branch of a tree, and notwithstanding the sparse foliage I had to look carefully for some minutes before I found it. Immediately the shot was fired a number of these beautiful birds flew out of the tree in all directions, in twos, threes and fours. Five birds flew into one tree, but I had to walk round it before I saw them. At last four heads were visible just raised from the thick limb, the bodies and tails lying horizontally along the timber. Subsequently Mr. Charles Pritchard, who accompanied the party as gold prospector, informed me that a breeding-place had been discovered on the Hale River, and in sending me three eggs of a set of five wrote me from that locality under date 15th November, 1894, as follows:—“This is the first time on record that they have made this their breeding ground, but I do not think they have come to stay, and perhaps in a year or so they may be as rare as ever. They travel in flocks, from one pair up to nearly any number, are very tame, feeding about the grass near the camp, and seem in no way afraid of people, cattle or horses. They breed in hollow trees, laying five eggs, and several pairs of birds occupy holes in the same tree. They are nesting now in the Eucalypts on the banks of the Hale River and other large water courses.” Mr. C. E. Cowle also wrote under same date that this Parrakeet was breeding on the Hugh River.

“Whilst most species of Parrakeets resort to the same districts to breed year after year, *Spathopterus alexandriæ* usually makes its appearance in some locality where it has never been seen before. Immediately the young ones are able to fly they assemble in flocks, and suddenly take their departure. In November, 1894, they came in great numbers to several places in the vicinity of Alice Springs, Central Australia, much to the surprise of residents who had been in the locality for thirty years without seeing them. They left again as soon as the young ones were reared, and only stray birds have been seen there since. In August, 1896, while with the Calvert Exploring Expedition, these Parrakeets were seen and specimens obtained in the Great Sandy Desert, North-western Australia, about three hundred miles north-east of Lake Way; others were also obtained as we went northwards towards Separation Well, but they were left with the abandoned collection at Joanna Spring. Subsequently in March, 1897, I shot two out of flock, when about fifty miles north of Joanna Spring. In May, 1897, Mr. L. A. Wells, our leader, saw them within fifty miles of the Fitzroy River, West Kimberley. During 1902 they appeared in flocks and bred near Menzies, Western Australia, and again disappeared a few weeks later. This species usually breeds about the time the *Spinifex* seed is ripening, and in the vicinity of water; as many as ten nests have been found in one tree. Whenever I saw them in either Central or North-western Australia, it was invariably amongst the *Spinifex*, the seed, which is like very small Canary seed, they are extremely fond of. They thrive well in captivity, but when they are breeding in an aviary it is necessary to remove the male as soon as the young are a few days old, or he will cause his mate to neglect her parental duty, and allow the brood to starve. Young birds are easily tamed, and will walk on the hand or arm of the person in the habit of feeding them. Under date 29th May, 1905, Mr. Keartland wrote me again as follows:—“I had a letter from Mr. L. A. Wells the other day, in which he informed me that whilst out on his last trip he saw *Spathopterus alexandriæ* breeding on the Alberga River, about eighty miles north-west from Oodnadatta, and also saw them in the Musgrave Ranges. They were, therefore, in South Australia proper, as the southern boundary line of the Northern Territory is only four miles south of Charlotte Waters.”

Mr. A. Zietz, then Assistant Director of the South Australian Museum, wrote me as follows under date 18th January, 1899:—“I think I ought to inform you of my success with *Spathopterus*

alexandrae, as it is the first instance of this species breeding in confinement, the only young one, which is now fully feathered, and which resembles the female, left the nesting-box yesterday. My birds successfully hatched eggs, and there were young ones last season, but unfortunately they died before they were feathered. This year, also, one of the young ones died when about a fortnight old. The female laid five eggs for a sitting, one was soft-shelled, two had young birds dead in them, and two were hatched. The adults are three years old, and are moulting now, and show a marked difference in colour. The male bird is very bright, but the hen is more of a dusky tinge."

Mr. Chas. French, Junr., Assistant Government Entomologist of Victoria, wrote me under date 6th January, 1903:—"My female *Spathopterus alexandrae* has laid a set of four eggs lately. This bird was given to me by Professor Baldwin Spencer, of the University of Melbourne, about eight years ago, and these are the first eggs she has laid." Writing me subsequently Mr. French remarks:—"I am posting you four eggs of *Spathopterus alexandrae*. They were laid on the 8th, 13th and 24th August and the 5th September, 1904. This makes eighteen eggs my bird has laid altogether; generally they get cracked. I put sawdust, rags, and grass in the cage, but she always shifts it away and lays the eggs on the tin bottom of the cage. A person in Melbourne has received a lovely pair of these birds, the male is a gem; they were taken from a nesting-place near Coolgardie, Western Australia."

Mr. Percy Peir writes me from Marrickville, near Sydney:—"I have had altogether four or five Alexandra or Princess of Wales Parrakeets (*Spathopterus alexandrae*), but singularly enough all have been females. A female I have had in captivity now for about four years is as bright in plumage as any male bird. I endeavoured to mate it with a *Polytelis barrabandi* but although they made a good deal of love to one another, and the female laid several clutches of eggs, there was no result as the eggs were broken soon after being laid. To attract the Green Leek she would spread her tail with her bill, displaying the pink inner web of the feathers, and he would in turn stand before her, and show off his scarlet band on the chest. I received a female from Mr. Clarkson, of Adelaide, who had it for six or seven years, and he informed me that it laid thirty or forty eggs every year. Those I have never made the slightest attempt at talking, but would keep up a rather distracting call throughout the day."

The eggs are four or five in number for a sitting, and vary from an ellipse to a rounded-oval in form, pure white, the shell being close-grained, smooth and lustrous. Three eggs of a set of five, taken by Mr. Chas. Pritchard from a hollow in a tree near the Hale River, in Central Australia, in November, 1894, measure:—Length (A) 1.05 × 0.9 inches; (B) 1.07 × 0.91 inches; (C) 1.01 × 0.85 inches. A set of five measures:—Length (A) 1.1 × 0.9 inches; (B) 1.12 × 0.92 inches; (C) 1.09 × 0.9 inches; (D) 1.07 × 0.92 inches; (E) 1.11 × 0.93 inches. Four odd eggs laid by a bird in confinement at Mr. C. French, Junr.'s, Camberwell, Victoria, in August and September, 1904, measure:—Length (A) 1.12 × 0.87 inches; (B) 1.1 × 0.9 inches; (C) 1.1 × 0.85 inches; (D) 1.22 × 0.83 inches.

Young males resemble the adult females, and are destitute of spatules.

November and the two following months constitute the usual breeding season in Central Australia.

Genus **PTISTES**, *Gould*.**Ptistes erythropterus.**

RED-WINGED LORY.

Psittacus erythropterus, Gmel., Syst. Nat., Vol. 1, p. 343 (1788).

Aprosmictus erythropterus, Gould, Bds. Austr., fol. Vol. V., pl. 18 (1848).

Ptistes erythropterus, Gould, Handbk. Bds. Austr., Vol. II., p. 37 (1865). *Salvad., Cat. Bds. Brit. Mus.*, Vol. XX., p. 181 (1891); *Sharpe, Hand-l. Bds.*, Vol. II., p. 33 (1900); *Salvad., Ibis*, 1907, p. 141.

Ptistes coccinopterus, Gould, Handbk. Bds. Austr., Vol. II., p. 39 (1865).

ADULT MALE—*Crown of the head and nape verditer-green; inter-scapular region black; lower back and rump deep blue, the lower portion lazuline-blue; upper tail-coverts yellowish-green; upper wing-coverts rich crimson red; quills black, the primaries having their outer webs and apical portion dark green, and the secondaries externally edged with dark green, some of them tinged with red near the tip; tail-feathers dark green tipped with pale yellowish-green, all but the central pair margined with dark brown on their inner webs; forehead and sides of the head light green; all the under surface, the under wing and under tail-coverts yellowish-green; bill orange-red, paler at the tip; legs and feet brown; iris red. Total length in the flesh 12.5 inches, wing 7.4, tail 5.8, bill 0.7, tarsus 0.7.*

ADULT FEMALE.—*General colour above dull green; rump blue, upper tail-coverts yellowish-green; wings dull green, the outer series of the median upper wing-coverts red, some of them externally margined with dull green; tail feathers green tipped with yellowish-green, the lateral ones edged with rosy-pink on their inner webs; all the under surface and under tail-coverts of a slightly paler yellowish-green than in the male.*

Distribution—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales.

RELEGATING, as Count Salvadori has previously done in the Catalogue of Birds in the British Museum, the *Ptistes coccinopterus*, Gould, to the position of a synonym of the present species, the range of the Red-winged Lory extends over the entire northern portion of the Australian Continent and throughout Queensland, and the inland portions of the northern half of New South Wales. Here again is an instance of a species found in the coastal districts of North-western Australia, the Northern Territory of South Australia and Queensland, but is only found inland in New South Wales, and never on the coast. Apparently the New England and the Blue Mountain Ranges form an effectual barrier in this State to many species which elsewhere are found also in the coastal districts. Gould remarks that "it is rather thinly dispersed among the trees skirting the rivers which intersect the Liverpool Plains, but from there towards the interior it increases in number." I first met with this species in New South Wales in November, 1866, on the Namoi River, and saw seven young birds in Narrabri taken from nesting-places in tree trunks twelve miles lower down the river. From here it occurs north to the Queensland border, and west to the Macquarie, Bogan and Castlereagh Rivers. In Queensland it is found on the Darling Downs, and there are specimens in the Australian Museum Collection procured by the late Mr. J. Rainbird at Port Denison in 1866, and by Mr. George Masters, at Gayndah, Burnett River, in August, 1870. One of the finest series of skins I have examined was procured by Mr. H. G. Barnard, on the Lower Dawson River, in October, 1908. Mr. A. F. Smith has noted numbers of them during a drought at Ingham, at the mouth of the Herbert River; and Dr. W. Macgillivray also records it from the Cloncurry District. In his Handbook Gould states:—"If ornithologists will compare the Crimson-winged Lories of Port

* Gould, Handbk. Bds. Austr., Vol. II., p. 37-39 (1865).

Essington and the adjacent north-western portions of Australia, with the red-winged birds from the east coast, I think but little doubt will remain on their minds that they are distinct from each other. The former are smaller than the latter in all their admeasurements, except in the bill, which is rather larger." With a series of eight specimens before me collected by the late Mr. Alex. Morton at Port Essington, Yam Creek and Port Darwin, also two specimens collected by Mr. E. J. Cairn in 1886 at Derby, North-western Australia, I cannot agree with that opinion, and hold that the birds from Eastern, Northern and North-western Australia are all of the same species, *Ptistes erythropterus*. The wing-measurement of three adult males obtained at Port Essington is 7·2, 7·3 and 7·4 inches respectively, of the adult males procured at Derby 7·4 and 7·7 inches, of three adult males obtained in Queensland, on the Lower Dawson River, Port Denison and Gayndah 7·25, 7·6 and 7·9 inches respectively. It will thus be seen that some northern and north-western birds are as large, and even larger than some from North-eastern Australia, and there is a variation in wing-measurements of birds procured in the same State, and even at the same locality. In two specimens only from North-western Australia is the crimson wing patch of the adult male slightly smaller; in the remainder it is indistinguishable in size and colour from that of eastern birds.

An adult male in the Australian Museum Collection has small yellowish tips to the outer webs of some of the median secondaries, which is also slightly tinged with red on the thigh. Another one has the outer primary of one wing yellow, while a third specimen has two pure yellow feathers on the crown of the head.

Dr. W. Macgillivray writes me as follows relative to this species in the Cloncurry District, Northern Queensland:—" *Ptistes erythropterus* is always about. I have often noted it feeding upon the honey-laden flowers of the *Bauhinia* trees."

Mr. H. G. Barnard, of Bimbi, Duarina, Queensland, sends me the following note:—" *Ptistes erythropterus* selects a large hollow tree to breed in, and frequently the eggs are deposited on the soft dirt thirty feet from the entrance. I have never found them nearer the entrance than ten feet; the male bird is away all day, returning about sundown; he sits on a neighbouring tree and whistles till the female leaves the nest, when they fly some distance off to a tree, where the male feeds his mate. After the feeding is over the female returns to the nest, and the male flies away for the night. Four or five eggs are laid for a sitting, and occasionally six. September to the end of December is the usual breeding season."

Mr. E. H. Lane, of Orange, New South Wales, writes me:—" The only nest I ever found of *Ptistes erythropterus* was near Wambangalang Station, Dubbo District. It was situated in the hollow trunk of a Box tree, about seventeen or eighteen feet from the ground, and contained one fresh egg lying on the decayed wood about twenty inches from the large opening. The tree was close to a small creek, and not more than fifty or sixty yards from a selector's dwelling. Hoping to get a full set of eggs I left the one, and visited the nest again after four days, but to my intense disgust I found it empty, probably robbed by one of the numerous Lace Lizards in that locality. It was during the month of October 1897 or 1898."

Mr. Robert Grant, Taxidermist of the Australian Museum, has handed me the following notes:—" The Red-winged Lory (*Ptistes erythropterus*) was in former years not uncommon on the Macquarie River, at Narromine, New South Wales, where I found these beautiful birds breeding in holes in the dead branches of the large *Eucalypti* on the river banks. Once, when camped there in the middle of November, 1882, I watched a pair going in and out of a hole in a tree, and evidently feeding their young. For a small sum a black-boy went up the tree and brought down three small nestlings. As my camp was close to the tree from which the young ones were taken, the old birds could hear them, and they would come circling around my tent. I made a rough nest of bark and grass, and placing the young ones in it put it in a bush close by, but the

old birds did not come near their young, and as I had nothing but damper and sugar to feed them on they only lived two days. In New South Wales these birds are fairly distributed on the Macquarie, Bogan and Castlereagh Rivers, but they are never found far from water."

Mr. G. A. Keartland, of Melbourne, wrote me as follows:—"Although *Ptilinopus erythropterus* will thrive on grain or Canary seed in captivity, those I saw in a state of nature on the Fitzroy River, North-western Australia, seemed to live entirely on the small black native figs, which were very plentiful near the river. I never saw them over a mile from water, and they usually breed in the trees on the river banks. Although the female may be seen to enter a hole in a branch many feet from the ground, she follows the hollow down to its base, and the eggs are laid on the rubbish at the bottom, often within a few feet of the root. Like most Parrakeets the female does all the sitting. I had a pair of young ones sent to me by Mrs. Chas. Clarke, of Mary Vale, Queensland, and before they were two years old they showed indications of breeding, but refused to use the hollow log provided for them. The hen laid one egg on the floor of the aviary, which I placed on some sawdust in a small box, with two low sides. She then laid three more in the box, and sat on them for ten days, when a mischievous boy scared her off the nest so many times that she broke two eggs and deserted the others. I am in hopes of better luck next time. Some Ornithologists incline to the opinion that there are two species of this genus, but I have had many skins through my hands from both North-western and North-eastern Australia, and failed to discover any specific difference."

The nesting-place is usually in the hollow trunk of a tree, and the eggs four to six in number laid on the debris at the bottom, and sometimes as far as thirty feet down, as Mr. Barnard has pointed out, from the entrance. The eggs are rounded-oval in form, white, the shell being close-grained, smooth and lustreless. A set of four taken by Mr. H. G. Barnard at Coomooboolaroo, Duaringa, Queensland, on the 25th September, 1892, measures:—Length (A) 1.18 × 1 inches; (B) 1.2 × 1 inches; (C) 1.23 × 1 inches; (D) 1.2 × 0.99 inches. In the same locality Mr. H. G. Barnard took a set of three on the 2nd October, 1892. Two eggs taken from a hollow trunk of a tree near the Fitzroy River, North-western Australia, on the 17th March, 1897, during the stay there of the Calvert Exploring Expedition, measure alike 1.18 × 0.97 inches.

Immature males have the basal portion of the feathers of the interscapular region green, and some of the scapulars green with blackish tips; the outer median and the entire greater-coverts crimson-red, the lesser and the inner median coverts yellowish-green mottled or edged at the tip with crimson-red. Wing 7.6 inches.

The breeding season in Queensland and Northern New South Wales is September and the three following months. In North-western Australia fresh eggs were obtained by the Calvert Exploring Expedition in March.

Genus *APROSMICTUS*, Gould.

Aprosmictus cyanopygius.

KING LORY.

Psittacus cyanopygius, Vieill., Nouv. Dict. d'Hist., tom. XXV., p. 339 (1817).

Aprosmictus scapulatus, Gould, Bds. Austr., fol. Vol. V., pl. 17 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 35 (1865).

Aprosmictus cyanopygius, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 486 (1891); Sharpe, Handl. Bds., Vol. II., p. 33 (1900); Salvad., Ibis 1907, p. 142.

ADULT MALE.—*General colour above green; wings green, the inner series of the upper wing-coverts pale verdigris-green; lower back and rump deep blue; upper tail-coverts black washed with*

olive. tail-feathers black, with a slight olive-green gloss, principally on their margins. head, neck, and all the under surface scarlet, a narrow line of dark blue feathers separating the hind-neck from the inter-scapular region; under tail-coverts scarlet, largely centred with black; under wing-coverts green, margined at their tips with dull blue; edge of the wing green; bill scarlet, paler at the tip; legs and feet nearly greyish-brown; iris yellow. Total length in the flesh 17 inches, wing 8.4, tail 8.4, bill 1, tarsus 0.8.

ADULT FEMALE.—Head, wings and upper surface green; rump feathers green largely tipped with dark blue; tail green, the lateral feathers with a bluish wash on their outer webs and tipped with pale rose. throat and chest dull green, with a dull red wash to the feathers of the chin and upper throat; lower portion of the breast and the abdomen scarlet; under tail-coverts green, broadly margined with scarlet.

Distribution—Queensland, New South Wales, Victoria.

THE King Lory, or "King Parrot" as it is more commonly called, is one of the comparatively few species figured by Surgeon-General White in his "Journal of a Voyage to New South Wales," from a specimen procured at Botany in May, 1788. In that work he refers to it as a variety of the 'Tabuan Parrot' (*Psittacus tabuensis*), a species, although somewhat resembling the King Lory of Australia, is now known to be restricted in its habitat to the islands of the Fiji Group. Another of New South Wales' earliest historians, Governor Phillip, in his well-known "Voyage to Botany Bay," also figures and describes it as a variety of the 'Tabuan Parrot.'

The range of this species extends from the neighbourhood of Cairns, in North-eastern Queensland, throughout the coastal districts of New South Wales, into Victoria, occurring as far west as the Otway Ranges. It evinces a decided preference for heavily timber-clad ranges, and humid scrubs, localities that afford it an abundant supply of seeds and berries, which constitute its usual food. During my early collecting days it was extremely common in the Strzelecki Ranges, in South Gippsland, Victoria, frequenting chiefly the tall *Eucalypti*; except when the breeding season was over, accompanied by their young they were frequently disturbed in the low undergrowth. In very severe winters these birds would eat the exposed portions of potatoes while growing in the crop. They, too, are extensively destructive to maize, both in the northern and southern coastal districts of New South Wales. When the maize is just ripening on the cobs, these birds make their appearance in large flocks, chiefly immature and young birds, and commit great havoc, stripping the cobs in many instances of every grain of seed.

Although some of its notes are harsh and loud, the male utters at times a soft and musical double call-note.

There is a very large series of specimens in the Reference Collection of the Australian Museum from the three eastern States. Most of these were obtained by Mr. Robert Grant, Taxidermist of the Australian Museum, on the Bellinger River, New South Wales, or by Messrs. E. J. Cairn and Robt. Grant while collecting on behalf of the Trustees of the Australian Museum at Cairns and on the Bellenden Ker Range, North-eastern Queensland. It includes also specimens obtained by Mr. George Masters at Wide Bay, in Southern Queensland, in 1867, and also at Ulladulla, New South Wales, the previous year.

Typically specimens from Cairns, are smaller than others obtained much farther south, on the Bellinger River. From the former locality the wing-measurement of adult males varies from 7.3 to 7.5 inches, and from the latter locality 8.3 to 8.4 inches. Intermediate-sized forms, however, are to be found in the Cairns District, the wing-measurement of one adult male being 7.75 inches. The bills of the northern birds are, too, comparatively larger. I cannot distinguish any difference in colour; newly-moulted birds from New South Wales are as brilliant in colour

as are those from Cairns. Many, however, of the specimens from the latter locality were procured just before the moult, and have that orange shade to the feathers, which is also seen in specimens obtained in Southern Australia.

Abnormal plumage is not uncommon. There is in the Australian Museum Mounted Collection a tendency to xanthochrism exhibited in an adult female procured in the Clarence River District. It is entirely yellowish-green, with the exception of the lower breast, abdomen and the broad margins to the tip of the under tail-coverts, these parts being scarlet. There is another skin of an adult female in the Reference Collection, which has the hind neck, upper portion of the back and the chest mottled with yellow feathers, and one or two greenish-yellow feathers on the rump. An adult male has the feathers on the head, hind neck, throat and breast of a pronounced orange-yellow shade, while another adult male has a few yellow feathers intermingled with the scarlet feathers on the nape. In the Queensland Museum, Brisbane, I saw the specimen which Gould described as *Afrosmictus insignissimus*. I regard it as a hybrid, *Afrosmictus cyanopygius* + *Ptilistes erythropterus*; another specimen has the upper part of the rump red.

From Copmanhurst, on the Upper Clarence River, Mr. George Savidge wrote me:—"The first set of *Afrosmictus cyanopygius* eggs, three in number, I found on the 8th November, 1897, in the bole of a large gum tree which stands close to a scrub near Cangai Stockyard, about forty miles from Copmanhurst. The blackfellow 'Cobby' saw the bird fly into the hole, and after waiting about fifteen minutes to see if it would fly out, we went to the tree to tap it out. After a minute or two we heard it climbing up inside the tree close to the ground, and it took it several minutes before it got to the top. We then chopped a hole six or seven feet from the ground, where we first heard it, and discovered the eggs, which were very slightly incubated. Thinking the full set of eggs were not laid Mr. Woods, my companion, shot the bird, but there were no other eggs ready for laying. From where the bird went in to the place the eggs were laid, was thirty-five to forty feet, and it seems a mystery how they take their young out. A friend of mine in December, 1901, caught a young one on the ground not able to fly. Do the old ones carry them up on their backs? the second nesting site was found on the 6th December, 1901, by one of my black collectors, named 'Jacky,' and this hollow tree contained two sets of eggs, four in each. One of the sets was just chipping out, and the other about a week incubated. The eggs were placed about two feet apart at the bottom of a hole in the bole of a large Gum tree. It seems remarkable that two pairs of birds should inhabit the one tree, but other Blacks, quite distinct from 'Jacky,' have told me they have found them before with many young ones, opening out both hands, evidently places where more than one pair of birds laid."

Writing under date 16th April, 1907, Mr. Savidge remarks:—"Last year I found a nest of the King Lory, and after watching for some time, felt sure that it had eggs, but after all we chopped it out before the bird had laid. This is the fourth time that I have done so."

From Belltrees, Scone, New South Wales, Mr. H. L. White wrote me:—"The King Parrot (*Afrosmictus cyanopygius*) is occasionally seen in this district. A nesting-place was found some few years ago by a boundary rider, who, instead of taking the eggs for me, decided to wait for the young ones, which were obtained after a great deal of trouble, the nesting hollow being followed down (by chopping) for some twenty-five feet before the birds were reached. Of the three birds thus obtained, one turned out a great talker and is a splendid looking fellow, taking just about three years to obtain his full plumage."

Mr. Robert Grant, Taxidermist of the Australian Museum, has given me the following notes:—"I first shot King Parrots while they were feeding in Lilly-pilly trees in the deep gorges at Mount Wilson, on the Blue Mountains, and later on at Wolgan. On the Bellenger River I

† Proc. Zool. Soc., 1875, p. 314.

shot a great number of these birds, mostly on cultivated or partially cleared lands, or around the barns, especially when the settlers were threshing their corn. In company with Mr. E. J. Cairn many specimens were also obtained around Cairns, and on the Bellenden Ker Ranges, in North-eastern Queensland, in 1888-9."

For the purposes of breeding the King Lory resorts to the hollow trunk of a large tree. In Gippsland, Victoria, burnt out trunks were more often resorted to. A nesting-place of a pair I saw at Childers, on the Strzelecki Ranges, was only about fifty yards from the house. The birds could be seen entering and leaving the top of a huge blackened and burnt out trunk in a cultivation paddock, and fully fifty feet from the ground. A rope was thrown over the only limb on the tree, and fortunately close to the top, and Mr. W. Waddell, who essayed the task of taking the nest, was pulled up. On reaching the top, and looking into the tree trunk, there was nothing to be seen but a dark and gloomy cavity. A lantern was procured from the house, and the nesting-place discovered about thirty feet down, on the debris at the bottom. By means of a rope he descended down the inside of the trunk, and after much trouble finally emerged blackened with the charred wood from head to foot and bringing with him four young and nearly fledged birds. Nesting-places were subsequently discovered in similar situations, but no eggs were taken during my stay there on many occasions.

The eggs are three to five in number for a sitting, rounded-oval in form, white, except where nest-stained with the decaying wood on which they are laid, the shell being close-grained, smooth and lustreless. A set of three taken by Mr. George Savidge in the Cangai Scrubs, on the Upper Clarence River, New South Wales, on the 8th November, 1897, measure:—Length (A) 1.27 × 1.08 inches; (B) 1.28 × 1.12 inches; (C) 1.29 × 1.07 inches.

Young males resemble the adult females. Immature males have the feathers of the head, hind-neck, throat and chest green, with patches of scarlet feathers here and there, and have the blue transverse band below the hind neck; the longer upper tail-coverts are black, and more pronouncedly washed with olive-green. Wing 7.7 inches.

The breeding season commences in October and lasts the three following months. Messrs. H. C. Robinson and W. S. Laverock record in "The Ibis" that Mr. E. Olive found this species breeding at Cairns, Queensland, on the 26th October, 1899; the nesting-place was situated in the hollow of a tree, about twenty feet above the ground, and contained five incubated eggs, so much so that two of them hatched before they could be blown.

Sub-family PLATYCERCINÆ.

Genus PLATYCERCUS, *Vigors.*

Platycercus elegans.

PENNANT'S PARRAKEET.

Psittacus elegans, Gmel., Linn. Syst. Nat., Vol. I, p. 318 (1788).

Platycercus pennantii, Gould, Bds. Austr., fol. Vol. V, pl. 23 (1848); *id.*, Handbk. Bds. Austr., Vol. II, p. 44 (1865).

Platycercus elegans, Salvad., Cat. Bds. Brit. Mus., Vol. XX, p. 541 (1891); Sharpe, Handl. Bds., Vol. II, p. 37 (1900); Salvad., Ibis, 1907, p. 311.

ADULT MALE.—*General colour above and below crimson-red; cheeks deep blue; scapulars and feathers of the back black margined with crimson-red; quills black, dark blue on their outer webs, except*

* Ibis, 1900, p. 644.

the apical half of the outer primaries, the median series of the secondaries narrowly edged externally with light blue, the innermost externally margined and extending around the tip with dull crimson-red; upper wing-coverts blue, darker on the lesser wing-coverts, and having a conspicuous patch of black feathers on the inner-coverts; four middle tail-feathers dark blue, the central pair washed with green on their inner webs, the remainder pale blue on their apical half, whitish at the tips, dark blue on the basal portion of their outer web, the inner web dark brown; bill horn colour; legs and feet blackish-brown; iris dark brown. Total length in the flesh 15 inches, wing 7.3, tail 8.5, bill 0.8, tarsus 0.7.

ADULT FEMALE—Similar in plumage to the male.

Distribution—Queensland, New South Wales, Victoria, South Australia, Norfolk Island.

PENNANT'S Parrakeet, or "Lowry" as it is more frequently called throughout the eastern and south-eastern portion of the continent, is one of the most widely distributed members of the genus occurring throughout South-eastern Queensland, Eastern New South Wales, Victoria and the South-eastern portion of South Australia. It is also found on Norfolk Island, but, as Count Salvadori points out in the "Catalogue of Birds in the British Museum," has been probably introduced there. Canon Tristram described the birds from Norfolk Island as *Platycercus pennanti*, var. *nobbsi*, but specimens in the Australian Museum received from Dr. P. H. Metcalfe, of Norfolk Island, confirm Count Salvadori's opinion that it is similar to the Australian species. I would here point out, however, that the wing and tail measurements given of *Platycercus elegans* in the "Catalogue of Birds in the British Museum," which are alike 6.7 inches, are smaller than those of typical New South Wales examples; the latter average 7.2 to 7.3 inches in wing measurement, and 8 to 8.5 inches in tail measurement. Like the preceding species, the farther north specimens are obtained, so are they smaller in their measurements, except that of the bill.

There is a great tendency to xanthochroism in specimens obtained in the temperate districts of New South Wales, and to melanism in those procured in the warm and moist tropical scrubs of North-eastern Queensland. Many beautiful examples illustrative of each are in the collection of the Australian Museum. A Pennant Parrakeet presented by Mr. W. E. Secombe, has the hind-neck, scapulars, back, breast and abdomen rich yellow, wings white with a faint bluish wash on the lesser and median wing-coverts, tail feathers white with the central pair indistinctly margined with light scarlet. Another specimen obtained in Victoria has the upper and under parts entirely greenish-yellow, except a frontal cap, and broad tips to the feathers on the fore-neck, lower flanks and under tail-coverts, which are scarlet, cheeks pale blue, quills white, upper wing-coverts like the back, except the outer series of the lesser and median coverts, which are pale blue, central pair of tail-feathers greenish-yellow, washed with light scarlet on their margins, the remainder pale blue. Partial albinism is exhibited in an immature specimen having the primaries, primary-coverts, some of the outer lesser wing-coverts and the bastard wing white, and two of the median secondaries on one wing white, faintly washed with yellow. There is also a hybrid *Platycercus elegans* + *P. eximius*.

I found this species extremely common in the heavily timber-clad ranges of South Gippsland, Victoria, and in similar country throughout the coastal districts of New South Wales. It also frequents open forest country, as well as low undergrowth, and passes a portion of its time on the ground in search of seeds of various grasses and small plants, which with small berries constitute its usual food. During March and April, when the young birds of the previous season flock together, they do considerable damage in orchards and grain fields, feasting upon the fruit and grain crops.

The accompanying figure of a haunt of Pennant's Parrakeet on the Blue Mountains, is reproduced from a photograph taken by me at Leura, in March, 1911. Not only was it resorted to by this species, but also by the Lyre-bird (*Menura superba*), the Yellow-tailed Black Cockatoo

(*Calyptorhynchus funereus*), the Pilot-bird (*Pycnoptilus floccosus*), the Rock Warbler (*Origma rubricata*), the White-fronted Scrub Wren (*Scricornis frontalis*), and many other fern-gully frequenting species.

Although as a rule Pennant's Parrakeet resorts to the higher *Eucalypti* on the mountain ranges, in autumn especially it passes its time in small flocks on the ground, principally



A HAUNT OF PENNANT'S PARRAKEET ON THE BLUE MOUNTAINS.

consisting of young birds. Both on the Strzelecki Ranges in South Gippsland, Victoria, and on the Blue Mountains, in New South Wales, have I flushed these birds, which were remarkably tame, when walking through the bush. When disturbed they would simply fly up on to a fern frond or low tree, and resume feeding again directly I had passed. This species was much more numerous in the Strzelecki Ranges than the Blue Mountains, although they are equally plentiful in the coastal ranges of the Illawarra District.

Mr. G. A. Keartland sends me the following notes from Melbourne:—"Dense forests, tall timber in hilly country, and rocky gorges are the usual haunts of *Platycercus elegans*, where it lives on grass seed,

but of late years it has become very troublesome to the orchardists near the Dandenong Ranges, where they play havoc amongst the apples, pears and quinces. When fully matured the sexes are alike in plumage, but whilst the male develops his crimson livery before two years old, the female takes much longer. It frequently happens that both may be found breeding whilst in the green plumage of the immature bird, but it is an ordinary occurrence for a crimson male to be found breeding with a green female. They live many years in captivity, but are often quarrelsome with other birds."

While resident at Hamilton, in the Western District of Victoria, Dr. W. Macgillivray sent me the following notes:—" *Platycercus elegans* developed a taste for the berries of the Box Thorn, and comes into the town to feed upon them when they are ripe in the autumn. The immature birds of this species keep very much to themselves, being seldom seen in company with birds in full adult plumage, possibly because the latter knowing their bright colours expose them to danger are more wary, or that the young birds, tranquil in the assurance of youth and the protection that a dark green suit affords, are inclined to be more venturesome."

Like all the members of the genus, Pennant's Parrakeet resorts to a hollow limb or spout of a tree for the purposes of breeding, depositing from five to eight eggs on the decaying wood or dust found in these cavities. The nesting-place may be within a few feet of the ground, or so high up in a tall *Eucalypti* as to be inaccessible.

The eggs are rounded oval in form, white, but usually more or less nest-stained, the shell being close-grained, smooth and slightly lustrous. A set of six eggs received from Mr. J. Gabriel, and taken by Mr. T. A. Brittlebank at Myrning, Victoria, on the 4th November, 1896, measures as follows:—Length (A) 1.12 × 0.96 inches; (B) 1.14 × 0.96 inches; (C) 1.17 × 0.97 inches; (D) 1.17 × 0.95 inches; (E) 1.17 × 0.97 inches; (F) 1.17 × 0.96 inches.

Young birds are dull olive-green above and below; tail feathers resemble those of the adult, but are more distinctly washed with olive-green; the inner wing-coverts olive-green like the back, the outer series dull blue, the median and greater coverts margined externally with dull olive-green, the crimson-red feathers first appearing on the forehead and crown of the head, fore-neck and under tail-coverts. Wing 6.8 inches. From this stage onwards examples may be found in every stage of parti-coloured plumage, usually the last trace of immaturity exhibiting itself in the greenish shade to the sub-margins of the inner quills.

The breeding season usually commences in Eastern Australia in October and continues until the end of January, or middle of February. Young birds recently taken from nesting-places may occasionally be seen exposed for sale in cages or baskets in the streets of Sydney, or in the bird-dealers shops, about the end of December. At this stage of their existence they are only about half feathered, and are of a uniform dull olive-green plumage. They are easy to rear, live well in confinement, and when adult learn to whistle and talk very well.

With a series of over seventy skins before me from all parts of its range, there appear to be two well defined geographical variations or races of the preceding species.

Specimens from Bellenden Ker Range, North-eastern Queensland, belong to a smaller and darker plumaged form of *Platycercus elegans*, which Dr. E. P. Ramsay described under the name of *Platycercus pennantii*, var. *nigrescens*.¹ Several specimens collected by Mr. Robert Grant in open forest lands, near Lake Eicham, are in the normal plumage of this smaller and darker coloured race, but others he procured in dense brush at Boar Pocket, only four miles away, exhibit traces more or less of melanism, from a few scattered black feathers along the dark crimson-red ones to others having most of the feathers on the head, cheeks, back and some on the breast, black. It is from the darkest of these melanistic forms that Dr. Ramsay's description of the type of var. *nigrescens* was taken. One of the wings and the tail feathers of the type are much abraded. Total length 12 inches, wing 6.2, tail 6.9. Wing measurement of a normal plumaged mounted specimen 6.4 inches.

It is somewhat remarkable that this northern form should more closely resemble the bird inhabiting Kangaroo Island, close to the South Australian coast. The latter form differs not

¹ Tab. List Austr. Bds., p. 34 (1888).

only from *Platycercus elegans*, Gmelin, by the greater amount of black on the feathers of the back, but principally by the inner half of the upper wing-coverts (except the margins of some of the median and greater series) being black, and for which I proposed the distinguishing name of *Platycercus melanopterus*.

Referrable to this form are the following notes of Mr. Edwin Ashby, of Blackwood, South Australia:—" *Platycercus elegans* is very numerous in the north-western part of Kangaroo Island. Full plumaged and handsome adult birds were far more common than immature birds, which is the reverse to what I found during a visit to Gippsland, Victoria. The Kangaroo Island form is blacker on the back than south-eastern specimens. It is remarkable that this species is so numerous on Middle River and Western River, Kangaroo Island, and should not occur in the Adelaide Hills, where its place is taken by *Platycercus adalaidæ*."

A set of five eggs taken by Messrs. A. and W. White, at Wilson River, Kangaroo Island, South Australia, on the 5th October, 1893, are rounded-oval in form, the shell being close-grained, smooth and slightly lustrous, and measure:—Length (A) 1.1 × 0.93 inches; (B) 1.08 × 0.93 inches; (C) 1.07 × 0.92 inches; (D) 1.07 × 0.92 inches; (E) 1.11 × 0.95 inches.

Platycercus adalaidæ.

ADELAIDE PARRAKEET.

Platycercus adalaidæ, Gould, Proc. Zool. Soc., 1840, p. 161; *id.*, Bds. Austr., fol. Vol. V., pl. 22 (1848).

Platycercus adalaidensis, Gould, Handbk. Bds. Austr., Vol. II., p. 46 (1865).

Platycercus adalaidæ, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 543 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 37 (1900); Salvad., Ibis, 1907, p. 311.

ADULT MALE.—Forehead, crown of the head, sides of the neck and all the under surface dull crimson, the median portion of some feathers, the basal portion of others of the breast dull yellow; cheeks deep blue; nape and hind-neck dull yellow, washed with crimson, some of the lower feathers of the latter with blackish centres; scapulars and inter-scapular region black margined with dull yellow, some of the former, as well as the outer margins of the inner median and greater wing-coverts and inner secondaries washed with dull crimson; lower back and rump yellow washed with crimson, the upper tail-coverts more pronouncedly crimson, very narrowly edged with yellow; a large patch on the lesser and median wing-coverts, and the outer series of the remainder pale blue; quills and primary-coverts black, their outer webs dark blue; the outer secondaries margined with pale blue; four central tail-feathers blue, the middle pair washed with green; the remainder dark blue on the back, their apical portion pale blue tipped with white, the greater part of the inner web of those next the central ones blackish-brown; bill whitish-horn colour, bluish at the base; legs and feet greyish-black; iris brown. Total length in the flesh 13.5 inches, wing 6.8, tail 7.7, bill 0.77, tarsus 0.7.

ADULT FEMALE.—Duller in plumage than the male, with less crimson and more dull yellow in the plumage of the under parts, and the margins of the feathers of the upper parts edged with very pale dingy greenish-yellow, and only a wash of crimson to the margins of the inner greater wing-coverts and inner secondaries.

Distribution—South Australia.

GOULD originally described this species in the "Proceedings of the Zoological Society of London," in 1840, and he stated that some of the finest specimens he procured in the very streets of the city of Adelaide. In his Handbook to the Birds of Australia he remarks:—"When I reached the interior of South Australia, in the winter of 1838, I found the adults

* Gould, Handbk. Bds. Austr., Vol. II., p. 47 (1865).

associated in small groups of from six to twenty in number; while near the coast between Holdfast Bay and the Port of Adelaide, the young in green dress were assembled in flocks of hundreds; they are generally on the ground in search of grass seeds, and when so occupied would admit of a near approach: when flushed they merely flew up to the branches of the nearest tree."

The specimens in the Australian Museum Collection were procured by Mr. George Masters, and the late Mr. Kendal Broadbent. From the preceding species the Adelaide Parrakeet may be distinguished by its very much paler red colour, and by the red feathers of the under parts being narrowly fringed with pale yellow.

From Tea-tree Gully, South Australia, Dr. W. A. Angove sends me the following notes:—
 "*Platycercus adelaidæ* is common through the ranges, and it has, I think, increased of late years, as I have noticed it nearer Adelaide than formerly. The heavily timbered flats and grass-covered gullies are its habitat. It feeds on the ground, and is fond of peas, to which crop it does some mischief: it also attacks the fruit, though its depredations are not so great as those of *Glossopsittacus concinnus*. The young of both sexes are green, and I have noticed a mature hen with a very green mate, but not to my knowledge the opposite. Their breeding months are October and November, and they depart from their favourite feeding grounds and spread in pairs all over the hills and gullies, so that one sees them in all sorts of unaccustomed spots. They build in the hollows and spouts of the Gums, and prefer a hole which has sound wood for its edges. The largest set of eggs I have taken is eight, at Golden Grove, near Adelaide, four to six being about the usual number. I have seen the bird at Manum associated with *Platycercus flavicollis*, and took their eggs near Manum in October 1907."

Dr. A. M. Morgan writes me as follows from Adelaide, South Australia:—"*Platycercus adelaidæ* was formerly common all around Adelaide, but is now rare; an odd pair may be generally seen in the hills. A little further north, about Angaston, they are still numerous and very destructive to fruit. They are ruthlessly destroyed by the orchardists, but do not seem to decrease much in numbers. They breed in the hollows of large Gum trees, the eggs being five, six or seven in number, and the main breeding season is in October and November, occasional clutches being found earlier or later. I am forwarding you an extract from Mr. W. Gilbert's letter, of Pensey Vale, *re P. adelaidæ*; the birds are very numerous in his district. He writes:—
 'I have gone through a lot of Adelaide Parrakeets under your direction, and so far found the brilliant birds to be all males. Some of the hens are brighter than others, one in particular had so much colouring that I thought it was a male, but still it was lacking the splendour the cocks display at this time of year.'

On the 26th May, 1909, Dr. Morgan wrote me as follows:—"The birds spoken of by Mr. Gilbert as brilliant are red. I have seen a great many *P. adelaidæ*, and do not remember to have ever seen one which looked yellow in flight except an albino in the Adelaide Museum, or to have seen one at all which was conspicuously yellow. I am myself convinced from what Mr. Gilbert tells me, that the males are the brilliant red birds, and that the females, although they become red with age, do not attain to the brilliancy of the male. Mr. Murray, of Mount Crawford, promised to send me a number, but he tells me there have only been dull coloured ones in his orchard for some time past."

For the purposes of breeding it selects a hole in a branch, or a hollow spout, usually of a Gum tree, depositing its eggs on the decaying wood or dust found in these cavities.

The eggs are five to seven in number for a sitting, rounded ovals in form, dull white, the shell being comparatively smooth and with hardly any lustre. On examining the shell with a lens, it will be found to be very finely granulate. A set of five taken by Messrs. A. and W. White, on the 15th September, 1894, from a hollow spout in a lofty Gum tree, growing on a hill

side of the Flinders Range, measure as follows:—Length (A) 1·1 × 0·91 inches; (B) 1·13 × 0·91 inches; (C) 1·11 × 0·93 inches; (D) 1·12 × 0·89 inches; (E) 1·06 × 0·9 inches. A set of seven received from Dr. A. M. Morgan, and taken in October, 1897, at Pensey Vale, Angaston, South Australia, measure:—Length (A) 1·13 × 0·95 inches; (B) 1·15 × 0·96 inches; (C) 1·15 × 0·97 inches; (D) 1·13 × 0·95 inches; (E) 1·19 × 0·95 inches; (F) 1·2 × 0·93 inches; (G) 1·17 × 0·95 inches. A set of three in Mr. G. A. Keartland's collection, taken in September, 1895, by Mr. W. White on the Flinders Range, measures:—Length (A) 1·12 × 0·88 inches; (B) 1·08 × 0·88 inches; (C) 1·12 × 0·88 inches.

September and the three following months constitute the breeding season of this species.

Platycercus flaveolus.

YELLOW-RUMPED PARRAKEET.

Platycercus flaveolus, Gould, Proc. Zool. Soc., 1837, p. 26; *id.*, Bds. Austr., fol. Vol. V., pl. 26 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 50 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 544 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 37 (1900).

ADULT MALE.—*General colour above and below a dingy pale yellow, with blackish centres to the feathers of the back and scapulars; a band on the forehead crimson, the lores and foreneck slightly washed with crimson; cheeks blue; quills black, their outer webs deep blue; the outer secondaries externally margined with pale blue, the inner ones, as well as the inner greater wing-coverts with pale yellow; the outer wing-coverts pale blue, the upper lesser wing-coverts deep blue, with a patch of black on the inner lesser and median coverts; two central tail-feathers blue washed with green, except towards the tips, the next pair blue on their outer webs, blackish-brown on their inner webs with pale blue tips; the remainder blue on their outer webs at the base, blackish-brown on their inner webs, their apical half pale blue; bill horn colour, whitish on the edge of upper mandible and at the base; legs and feet dark greyish-black; iris black. Total length in the flesh 13·5 inches, wing 6·4, tail 7, bill 0·7, tarsus 0·72.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution—New South Wales, Victoria, South Australia.

T^N general appearance, when viewed on the under parts, the Yellow-rumped Parrakeet closely resembles *Platycercus flaviventris*, the only difference being in the depth and intensity of the yellow colouring. It is, however, a smaller and paler bird, especially on the upper parts, and has that washed-out appearance usually associated with birds frequenting hot and arid districts, and not the southern and more temperate parts of the Australian continent, where it is found. Gould, who described this species from an example obtained in New South Wales, beautifully figures it in his folio edition of the "Birds of Australia," but none of the specimens in the Australian Museum Collection are so clear a yellow as is there represented. There was a large number of these birds exposed for sale in the bird-dealer's shops in George-street, Sydney, in January, 1911. I saw over one hundred birds, adult and young, in one box.

The range of this species extends throughout the greater part of Southern New South Wales, into Northern and North-western Victoria, and the south-eastern portions of South Australia. The specimens in the Australian Museum Collection were procured by Mr. George Masters at Wagga Wagga, on the Murrumbidgee River, by the late Mr. K. H. Bennett on the Lachlan River, and there is a single specimen from Mildura, Victoria, received in exchange from the Trustees of the South Australian Museum, Adelaide. Dr. A. M. Morgan, who met with this species at Laura, in South Australia, and as far south and west as Port Augusta, has also presented an adult male and female *Platycercus barnardi* + *P. flaveolus*, and wrote me:—"I

am sending you male and female hybrids of *Platycercus barnardi* + *P. flavcolus*, shot near Wirrabarra. The female was mated with a male of *P. flavcolus*, and the eggs contained embryos."

Mr. F. A. Shelley informs me this species is very common in the vicinity of Wagga, on the Murrumbidgee River, New South Wales, usually being met with feeding in small flocks in the *Eucalypti* along the banks of the river. During the latter part of 1909 he found a pair breeding in a dead branch of a hollow tree on the edge of a lagoon, the nesting-place being about three feet down the hole, which was forty feet from the ground. In the same tree was a nesting-place with eggs of the Red-rumped Parrakeet (*Psepholus hamatnotus*). Another nesting-place of *Platycercus flavcolus* contained young. Mr. Shelley informs me these birds have a peculiar musty odour, which extends to their nesting-places, and still remains when their bodies are cooked and prepared for the table."

Mr. Percy Peir writes me from Marrickville, Sydney:—"I saw the Yellow-rumped Parrakeet (*Platycercus flavcolus*) at Whitton, near Narrandera, New South Wales, in small flocks of about eight or more, and they were always difficult to approach, being of a shy nature. Of later years these Parrakeets have appeared more frequently in the bird-dealers shops in Sydney, but never more than about half a dozen at a time. In the early summer a few young birds arrive in the market, but I have never heard of any being reared. I have had several pairs flying in the aviary, but they never made the slightest attempt to breed. The variation in plumage is very great, so much so that at times it is difficult to distinguish them from the Adelaide Parrakeet. They are generally known as the 'Murrumbidgee Rosella,' and are rather short lived, seldom surviving four years of confinement."

The late Mr. K. H. Bennett, of Yandambah Station, wrote:—"The habitat of *Platycercus flavcolus* in New South Wales is the belt or fringe of large Gum trees bordering the Lachlan, Darling and Murrumbidgee Rivers, and so exclusively is it found where the Eucalyptus flourishes, that it is never met with beyond their range. Usually it occurs in pairs, or in small flocks of five or six individuals, probably the parents and brood of the year. It breeds during the months of September and October, and the eggs, four in number, are deposited in some hollow branch. The young of the year have the green plumage of *Platycercus pennantii*. On this point I can speak with confidence, having reared them from the nest."

From Melbourne Mr. G. A. Keartland sends me the following notes:—" *Platycercus flavcolus* is known under such names as 'Swamp Lory,' 'Blam Blam,' and 'Yellow Rosella.' These birds are most numerous along the course of the Murray and Murrumbidgee Rivers, or near the swamps in the neighbourhood of Swan Hill. Whilst some are particularly highly coloured, others are not so. This remark applies to both adults and young. In December, 1902, Mr. Frank Williams sent six nestlings from Wagga, and some of them were more brightly coloured than adult birds I shot in the same district shortly before. Others again were as dull as the young of *P. flaviventris*, but not quite so dark."

Dr. A. M. Morgan writes me as follows from Adelaide, South Australia:—" *Platycercus flavcolus* was common in the Laura district and as far north as Port Augusta; north of that I did not meet with them. They vary very much in plumage; what I took to be very old birds have a great deal of red about them, so that they might almost be confounded with *P. adalaida*. They bred in the hollow limbs of the large gum trees in the bed of the Rocky River. They did not do any damage to the gardens that I heard of, being rather shy birds. I found them breeding at Port Augusta in a Gum creek leading out of the Flinders Range. The eggs are six or seven for a clutch, and the breeding season is from August to November, August and September being the time when most of them lay."

In July and August, 1900, Dr. Morgan noted this species at Port Augusta, where a specimen was obtained, but not further north, during his trip to the Mount Gunson District.

It breeds in a hole in a branch, usually of a Gum tree. Nesting-places found on the Murrumbidgee River, New South Wales, were in trees near the river banks, and varied in height from fifteen to fifty feet from the ground.

The eggs are five in number for a sitting, rounded-oval in form, dull white, the shell being close-grained, smooth, and slightly lustrous. A set received from Dr. A. M. Morgan, and taken on the 25th October, 1895, at Wirrabarra, on the Rocky River, one hundred and fifty three miles north of Adelaide, and twelve miles from Laura Railway Station, measure as follows:—Length (A) 1·11 × 0·89 inches; (B) 1·1 × 0·9 inches; (C) 1·11 × 0·88 inches; (D) 1·08 × 0·88 inches; (E) 1·12 × 0·87 inches. Three eggs of a set of four in Mr. G. A. Keartland's collection, taken by Mr. W. White on the 2nd September, 1895, from a hole in a Gum tree at Canalla Creek, Flinders Range, South Australia, measure:—Length (A) 1·12 × 0·92 inches; (B) 1·1 × 0·88 inches; (C) 1·08 × 0·91 inches. A set of five taken by Mr. Frank A. Shelley near the Murrumbidgee River, about seven miles from Wagga, New South Wales, on the 4th December, 1909, measure:—Length (A) 1·07 × 0·89 inches; (B) 1·08 × 0·92 inches; (C) 1·09 × 0·9 inches; (D) 1·08 × 0·91 inches; (E) 1·07 × 0·92 inches.

Young birds differ from the adults in being dull green above with brown centres to most of the feathers, rump and upper tail-coverts yellowish-olive, the secondaries and the inner series of the greater wing-coverts are dull yellowish-green; there is no black patch on the lesser and median wing-coverts, this part being brown with dull yellowish-green margins to the feathers, and the band on the forehead is orange-red. Wing 6 inches.

September and the four following months constitute the usual breeding season of this species.

Platycercus flaviventris.

YELLOW-BELLIED PARRAKEET.

Psittacus flaviventris, Temm., Trans. Linn. Soc., Vol. XIII., pp. 117-118 (1821).

Platycercus flaviventris, Gould, Bds. Austr., fol. Vol. V., pl. 24 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 48 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 545 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 37 (1900).

ADULT MALE—*General colour above dull green with brownish-black centres to the feathers, the inner greater wing coverts and innermost secondaries similar, but with a distinct yellowish-green wash to their outer margins; lower back, rump, and upper tail-coverts dull green margined with yellowish-olive, these margins broader on the latter and partially concealing their dull green bases; quills, except the innermost secondaries, dark brown on their inner webs, dark blue on their outer webs; the outer and upper lesser wing-coverts dark blue, the outer median and greater coverts paler blue, with a patch of black on the inner lesser and median wing coverts; central pair of tail-feathers bronze-green, bluish towards the tips of their outer webs; the next pair blackish-brown on their inner webs, dark blue on the outer and narrowly edged with white at the tips, their outer webs for three-fourths of their length from the base bronze or olive-green; the remainder dark blue on their outer webs, black on their inner, and having their apical half pale blue; crown of the head and sides of the face yellow tinged with olive, and having crimson tips to the feathers below the eye; a broad band on the forehead crimson; cheeks deep blue; throat and all the under surface and under tail-coverts yellow, very slightly tinged with greenish-olive, some of the longer ones margined with orange; bill whitish-horn colour, bluish at the base; legs and feet greyish-brown; iris brown. Total length in the flesh 14·5 inches, wing 7·5, tail 7·8, bill 0·8, tarsus 0·78.*

ADULT FEMALE.—*Similar in plumage to the male, but smaller. Wing 5 inches.*

Distribution—Tasmania and most of the larger Islands of Bass Strait.

THE Yellow-bellied Parrakeet, or "Green Parrot" as the early colonists of Tasmania named it, and applicable only to the young of the present species, is widely distributed over Tasmania and some of the larger islands of Bass Strait. There is a fine series of skins in the Australian Museum Reference Collection, procured by Mr. George Masters at the Ouse River and Lachlan Vale in April, 1867, and by the late Mr. Kendal Broadbent, at Badger Head, in Northern Tasmania. It is noteworthy that out of twenty specimens now before me only eight are in the fully adult plumage figured by Gould in his folio edition of the "Birds of Australia," the remainder being in the immature or young stage of plumage, and having the under parts green, some of which are washed more or less with yellowish-olive. Both in adult and young birds, specimens may be found which have some of the feathers of the throat and foreneck washed with dull crimson, and the under tail-coverts are more broadly margined with olive, which is more pronounced in the adult females. Others have the feathers surrounding the deep blue cheeks washed with orange.

Dr. L. Holden writes from Southern Tasmania:—" *Platycercus flaviventris* is the common Parrakeet of the mountains and forests of Western Tasmania, the districts with a heavy rainfall. In 1895, while riding by the bridle track from Cressy to Ross, in the midlands of Tasmania, I saw one enter a hole in a tree by the track side."

From Melbourne Mr. G. A. Keartland writes me as follows:—" *Platycercus flaviventris* utters a note very similar to that of *P. elegans*. These birds are numerous on the islands of Bass Strait and in Tasmania. I shot several on King Island, and also on islands in the Kent Group. They are all very dark green in colour."

From Glenorchy, Tasmania, Mr. M. Harrison wrote me in January, 1910:—" Years ago I remember the 'Green Parrakeet' (*Platycercus flaviventris*) as very plentiful in the Midlands, where numbers of them might be seen in the season feeding upon the fruit of the Hawthorn and Sweet Briar hedges. I can also recollect them congregating about the barn doors in the old hand-threshing days among the domestic fowls, just as described by Gould. As unfortunately is the case with so many of our native birds, however, they are not now to be found in numbers anywhere approaching 'old times,' and except in a few favoured localities their eggs are difficult to obtain, and are looked upon as a 'good find.' About here they are scarce, but I remember some years ago that a visitation was made by them to these southern parts literally in thousands. Every man possessing the semblance of a gun was after them for the pot, and the number slain must have reached a high figure. Only once since, some eight or nine years ago, has this occurred where flocks, although not so large as on the previous occasion, spread over the Derwent Valley as far down as Austin's Ferry. Presumably some accident of climate and consequent deficiency in food supply in their usual habitat was responsible for the occurrence. On the 2nd December, 1908, I was out with Mr. A. E. Brent at Bothwell, when he took a set of five eggs from the hollow spout of a Eucalyptus. The eggs, which were very slightly incubated, were deposited on a bed of decayed wood, apparently ground to powder, of which there was a very large quantity. Both birds were at the nest, and both had the rich colouring of fully mature birds. At the end of November, in the previous year, and in the same locality, Mr. A. L. Butler and myself found a nesting-hole with the bird in attendance. The tree, however, was large and the hole situated at such an awkward elbow as to be inaccessible to us. On visiting it last year we found Starlings in possession. The eggs vary from four to seven or eight in number for a sitting. As is usual with the Tasmanian PSITTACIDÆ, the nesting season is late, generally in December."

Mr. R. N. Atkinson, of Penguin, Tasmania, writes me:—" *Platycercus flaviventris*, locally known as the 'Green Parrot,' may often be seen in the winter months, and just before the breeding

* Gould, Bds Austr., fol. Vol. V., pl. 24 (1848).

season, in flocks of from ten to thirty or even more, and large numbers can be flushed from the ground, where their food is obtained, in the form of dock, grass, and other seeds. On these occasions it is not unusual for a sentry bird to be on duty in a neighbouring tree, and in the event of an intrusion a warning note from him will cause the whole flock to fly into the trees, or away to a fresh feeding ground. I have never found this species breeding in this part of the Island, but they no doubt resort to the lofty trees which abound here, where they can rear their broods in comparative safety. The note is a loud harsh screech resembling 'tussock,' sometimes repeated; also a clear whistling call, an imitation of which will almost invariably bring an answer if there are any in the vicinity. This species, sometimes called by the settlers 'Tussock Parrot,' is much used here for table purposes."

Gould remarks:—"Holes in the large Gum trees afford this species a natural breeding place. The eggs, which are laid in September and the three following months, are of a pure white colour, and six or eight in number, one inch and two lines long by eleven and a half lines broad. When the young are first hatched they are covered with long white down, and present an appearance not very dissimilar to that of a round ball of cotton wool."

A set of four eggs in Mr. Malcolm Harrison's collection, taken by Mr. E. Kermode at Longford, Tasmania, in 1895, are rounded-oval in form, dull white, smooth shelled and lustreless. They measure:—Length (A) 1·2 × 0·99 inches; (B) 1·18 × 0·98 inches; (C) 1·2 × 0·98 inches; (D) 1·19 × 0·98 inches. Two eggs of a set of five taken by Mr. G. K. Hinsby measure:—Length (A) 1·17 × 0·92 inches; (B) 1·15 × 0·93 inches.

Young birds are dull green above, with indistinct, dark brown centres to the feathers; outer series of the lesser and median wing-coverts dull blue, the remainder, as well as the secondaries, like the back; crown of the head and sides of the face dull green washed with yellowish-olive; band on the forehead narrower and of a crimson-orange; cheeks blue, all the under surface dull green, the feathers of the breast washed with yellowish-olive; under tail-coverts green margined with yellowish-olive. Wing 6·5 inches.

Platycercus pallidiceps.

PALE-HEADED PARRAKEET.

Platycercus palliceps, Vigors, Lear's Parr., pl. 19 (1832); Gould, Bds. Austr., fol. Vol. V., pl. 26 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 51 (1865).

Platycercus pallidiceps, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 547 (1891); Sharpe, Handl. Bds., Vol. II., p. 37 (1900).

ADULT MALE.—*Head white, the apical portion of the feathers yellow; hind-neck, scapulars and upper back black, all the feathers broadly margined with rich yellow; lower back, rump and upper tail-coverts pale greenish-blue, the centres of the basal portion of the feathers of the former black; upper wing-coverts blue, darker on the upper lesser series, with a black patch on the inner lesser and median series, some of the feathers being narrowly tipped with blue; quills dark blue, the apical portion of the second to the fifth primaries edged externally with ashy-white, the outer secondaries margined externally with pale blue, and the inner secondaries margined around their tips with pale greenish-blue, some of the outer secondaries and the inner greater wing-coverts also edged with greenish-yellow; central pair of tail-feathers dark blue, with a greenish wash, except towards their tips, and which is more pronounced on their margins; the next pair dark blue on their outer webs, blackish on their inner webs and tipped with white; the remainder similar on their basal portion, but*

the apical half is pale blue tipped with white; cheeks white; all the under surface pale blue; under tail-coverts scarlet. Total length in the flesh 13 inches, wing 6.4, tail 7, bill 0.8, tarsus 0.7.

ADULT FEMALE.—Similar in plumage to the male.

Distribution—Queensland, Northern New South Wales.

IN no species of the genus *Platycercus* is individual variation so marked as in the Pale-headed Parrakeet, or "Moreton Bay Rosella." The above described specimen is what I regard as the typical and more commonly met with form, but it is possible for one to obtain a dozen or more variations of it. Many specimens have the fore-neck white or pale yellowish-white. Scattered red feathers may be found on the crown of the head, nape, ear-coverts and rump, or in the form of a narrow band on the forehead. Others are very much darker on the under parts, especially the skins of birds that have been kept in captivity, and due probably to the altered nature of their food. The cheeks in some may be altogether white, or the lower portion deep blue. Of two remarkably plumaged specimens in the Australian Museum Reference Collection, and showing a tendency to albinism, one, an adult male obtained by Mr. H. G. Barnard at Coomooboolaroo, Duaringa, Queensland, on the 17th June, 1897, has an indistinct narrow reddish band on the forehead; crown and sides of head yellowish-white, and of a richer yellow on the hind-neck, upper portion of back white, the apical half of the feathers yellow; scapulars white, slightly washed with yellow and crimson; some of the wing-coverts and quills white, or partially white, and the foreneck and upper portion of the breast pale yellowish-white. The other, an adult female, also procured by Mr. H. G. Barnard at Bimbi, Duaringa, on the 16th September, 1905, is somewhat similar, but has the rump and upper tail-coverts white, with a faint greenish-blue wash on the latter, and one of the central pair of tail-feathers is white; most of the lesser and median upper wing-coverts and the primary-coverts are white; all the under surface white with a faint yellowish tinge to the feathers on the fore neck and breast, the apical portion of some of the feathers of the latter and of the thighs pale blue; under wing-coverts white.

The range of *Platycercus pallidiceps* extends from the neighbourhood of the Herbert River, south throughout the greater portion of Queensland into Northern New South Wales. It is represented in the Australian Museum Collection by specimens from the coastal districts of Port Denison and Moreton Bay, and inland from the Dawson River, Chinchilla and other portions of Central and Western Queensland. Except in the extreme north, it does not occur in the coastal districts of New South Wales, and is but sparingly distributed in the northern and central portions of the State. I met with it in November, 1897, on the Mehi and Gwydir Rivers, about seventy miles from the Queensland border. It was breeding during the time of my visit in the ring-barked and dead trees, so only one specimen was obtained in bleached and abraded plumage.

From Bimbi, Duaringa, Queensland, Mr. H. G. Barnard sends me the following notes:— "*Platycercus pallidiceps* breeds at almost any time, as I have taken their eggs in February, March and April, and again from June to December. The general time is, however, from June to November. The eggs, four to six in number for a sitting, are generally from one to two feet from the entrance. I found a nest on the 10th August, 1908, with young ones. On the 6th March, 1909, I took a set of five fresh eggs in a dead Gum tree. The entrance to the nesting-place was seventy-four feet, and fifty-two feet to the first limb. It was hard work cutting steps in the dead wood. This nesting-place was the highest I have ever seen of this species. Of two nests taken in March, 1909, in the first the eggs were two feet six inches below the entrance, and in the second just two feet. Other nests I have taken at a depth of five feet from the entrance, never more, and on one occasion so near the entrance that a slight depression in the decayed wood and dust was the only thing that kept the eggs from rolling out of the hole. The distance

from the ground to the nesting-hole also varies greatly, as I have taken eggs from a stump, the entrance hole of which was only six feet from the ground, and again, as stated before, at a height of over seventy feet. This species breeds at almost any time of the year."

Mr. Robert Grant has handed me the following note:—"When collecting towards the latter end of 1882, on an adjoining run to Glenariff Station, I was surprised by flushing a pair of 'Moreton Bay Rosellas' from a Wilga tree. They settled on another tree some distance away, and I at once followed them up, and was fortunate in procuring both birds, which proved to be male and female. This was the only time I have seen *Platycercus pallidiceps* in that part of New South Wales." Glenariff is four hundred and forty-six miles west of Sydney, and about fourteen miles from Byrock.

For the purposes of breeding it resorts to a hollow limb of a tree, usually a gum, depositing from four to six eggs on the decaying wood or dust found in these cavities.

The eggs are elliptical, oval, or rounded-oval in form, pure white, but are usually more or less stained with the decayed wood on which they are laid, the shell being close-grained and smooth. Of four sets now before me two are entirely dull and lustreless, the others have a very slight lustre. They were all taken by Mr. H. G. Barnard, and three sets measure as follows:—A set of five taken at Coomoolaroo, Duaringa, Queensland, on the 19th March, 1893:—Length (A) 1.07 × 0.85 inches; (B) 1.03 × 0.84 inches; (C) 1.02 × 0.85 inches; (D) 1.04 × 0.86 inches; (E) 1 × 0.81 inches. A set of four taken at Bimbi, Duaringa, on the 9th September, 1908:—Length (A) 1.07 × 0.88 inches; (B) 1.05 × 0.87 inches; (C) 1.07 × 0.84 inches; (D) 1.05 × 0.87 inches. A set of five taken in the same locality on the 25th September, 1908:—Length (A) 0.93 × 0.8 inches; (B) 0.97 × 0.8 inches; (C) 0.95 × 0.8 inches; (D) 0.94 × 0.82 inches; (E) 0.96 × 0.79 inches.

Young birds resemble the adults but are paler, and the feathers of the forehead and crown of the head are dull red, the feathers of the under parts are very much paler, and some of them on the breast and abdomen have yellowish-green margins, under tail-coverts dull scarlet. Wing 6 inches.

The time of breeding varies with the season, as will be seen by Mr. Barnard's notes. After a good rainfall this species breeds as freely in March as it does in September, but it nests at all times of the year.

Platycercus mastersianus, Ramsay, the type of which I have before me, is not a species, but an hybrid; from the blue cheeks, large amount of red feathers on the head, upper back and rump apparently between *Platycercus elegans* and *P. pallidiceps*. On the under surface, with the exception of a few scattered crimson feathers on the chest, the plumage is similar to that of the latter species.

Platycercus amathusia, Gould, is a northern race of *P. pallidiceps* inhabiting the Cape York Peninsula. Specimens from the neighbourhood of Cairns, Queensland, are intermediate between the two forms.

* Ramsay, Proc. Linn. Soc. N. S. Wales, Vol. 11, p. 27 (1877).

Platycercus browni.

BROWN'S PARAKEET.

Psittacus browni, Temm., Trans. Linn. Soc., Vol. XIII., p. 119 (1821).

Platycercus brownii, Gould, Bds. Austr., fol. Vol. V., pl. 31 (1848); Salvad., Ibis, 1907, p. 312.

Platycercus venustus, Gould, Handbk. Bds. Austr., Vol. II., p. 53 (1865).

Platycercus browni, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 549 (1891); Sharpe, Handl. Bds., Vol. II., p. 37 (1900).

ADULT MALE.—Crown of the head, nape, lores, a line of feathers below the eye and the ear-coverts black; cheeks white, bordered with blue, except on their anterior part; feathers of the hind-neck and back and the scapulars black, margined with straw yellow, broader on the latter; feathers of the lower back, rump and upper tail-coverts straw-yellow fringed with black, their basal portion centred with black; upper wing-coverts deep blue, with a black patch on the inner series; quills blackish, the innermost secondaries broadly margined externally with straw-yellow, the outer webs of the remainder deep blue, becoming paler on the apical half of the outermost primaries; four central tail-feathers dark blue, the central pair washed with green, the remainder dark blue at the base of the outer web, the inner web blackish-brown, their apical half pale blue and tipped with white; feathers of the foreneck and chest blackish-brown at the base, straw-yellow on their apical portion; feathers of the remainder of the under surface straw-yellow distinctly fringed with black; under tail-coverts scarlet; bill horn colour, bluish at the base; legs and feet dark slaty-grey; iris blackish-brown. Total length in the flesh 12 inches, wing 5.9, tail 6, bill 0.72, tarsus 0.65.

ADULT FEMALE.—Similar in plumage to the male. Wing 5.7 inches.

Distribution—North-western Australia, Northern Territory of South Australia, North-western Queensland.

THIS species, named after the late Dr. Robert Brown, the celebrated Botanist, and who was so largely associated with the nomenclature of Australian Botany, is an inhabitant of North-western Australia, the Northern Territory of South Australia, and North-western Queensland. Gould beautifully figures this species in his folio edition of "The Birds of Australia;" also one with the crown of the head dark blood-red. Most of the specimens in the Australian Museum Collection were procured by the late Mr. Alexander Morton, near Port Essington, in January 1879. There is also a specimen netted by the late Mr. J. D. Young, near Port Darwin, and in the same locality the late Mr. Edward Spalding procured examples on behalf of the late Sir William Macleay, and which are now in the Macleay Museum at the University of Sydney. In "Novitates Zoologicae"† Dr. Ernst Hartert records specimens collected by Mr. J. T. Tunney in May, 1902, from the Ord River, North-western Australia, and several localities in different parts of the Northern Territory of South Australia, and makes some interesting remarks on the plumage of this species. Of recent years many living examples have been brought to Sydney, and nearly all came from the neighbourhood of Port Darwin. One of these beautifully plumaged birds, secured from the late Mr. J. D. Young, lived in an aviary in the Botanical Gardens for many years.

Mr. Percy Peir sends me the following notes from Marrickville, Sydney:—"Beyond rarity and plumage there is little to recommend *Platycercus browni*. I have always found it of a sulky disposition and practically 'voiceless.' With a few kept in captivity their existence seldom went beyond a couple of years. From friends at Port Darwin I have learned that these Parakeets, known locally as 'Port Darwin Rosellas,' are numerous in some seasons of the year,

* Bds. Austr., Vol. V., pl. 31 (1848). † Nov. Zool., Vol. XII., p. 213 (1905)

and no one seems to bother about trapping them, as there is more profit and less handling in trading in Finches. The fabulous prices asked for them in the Sydney shops, where they appear occasionally, precludes any ordinary individual from indulging in such a luxury. As much as £3 10s. per pair has been asked, whereas I never paid more than 10s. from residents in Port Darwin."

Two eggs in Mr. G. A. Keartland's collection, taken from the hollow limb of a tree near the Daly River, in the Northern Territory of South Australia, on the 5th August, 1903, and accompanied with a skin of the parent bird, are rounded-oval in form, the shell being close-grained, white and lustreless, and much stained with the decaying wood on which they were laid. They measure:—Length (A) 1.01 × 0.84 inches; (B) 1.05 × 0.86 inches. There were only two eggs in the nesting-place, but probably five or six eggs would be the full complement.

Young birds resemble the adults, but are duller in colour and have the straw-yellow margins of the scapulars and feathers of the upper back paler and broader, head and nape brownish-black, some of the feathers centred with dull red and yellow; cheeks entirely dull blue; foreneck brownish-black; remainder of the under surface a uniform very pale straw-yellow, some of the feathers on the centre of the lower abdomen and the under tail-coverts dull scarlet. Wing 5.5 inches. A specimen showing a further progress towards maturity, has most of the feathers of the under surface a richer straw-yellow, fringed with black, and some of those of the foreneck and breast centred with dull red. An otherwise fully adult male has a few red feathers on one side only of the forehead.

Platycercus eximius.

ROSE-HILL PARRAKEET.

Psittacus eximius, Shaw, Nat., Miscel., pl. 93 (1792).

Platycercus eximius, Gould, Bds. Austr., fol. Vol. V., pl. 27 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 55 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 551 (1891); Sharpe, Handl. Bds., Vol. II., p. 38 (1900); Salvad., Ibis, 1907, p. 312.

ADULT MALE.—*Head, sides of the neck and upper breast scarlet, nape yellow; scapulars and feathers of the back black margined with greenish-yellow; rump and upper tail-coverts yellowish-green; quills dark blue on their outer webs, blackish on their inner webs, the outer secondaries margined externally with light blue, the inner series also of the greater wing-coverts margined externally with yellowish-green; primary coverts dark blue, the lesser and median and the outer series of the greater wing-coverts violet-blue, with a black patch on the inner lesser and median coverts; tail-feathers blue, the four central feathers washed with green, but more strongly on the central pair; the remainder dark blue at their bases, light blue on their apical portions and tipped with white; cheeks white; lower breast yellow with very narrow dusky edgings to the feathers; abdomen yellowish-green; under tail-coverts scarlet; bill pale bluish-horn colour; legs and feet dark grey; iris dark brown. Total length in the flesh 13.5 inches, wing 6.3, tail 6.5, bill 0.7, tarsus 0.75.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution—New South Wales, Victoria, South Australia, Tasmania?

THE Rose-hill Parrakeet, or "Rosella," as it is more frequently called, is freely distributed throughout the south-eastern portion of the Australian continent and most parts of Tasmania. It frequents alike the brushes of the coast as well as the mountain ranges and open forest lands, passing much of its time on the ground in search of seeds of various grasses, which

with wild fruit and berries constitute the normal food of this species. Unfortunately the Rose-hill Parrakeet is very destructive in orchards, nipping off the blossoms of various kinds of fruit trees in a spirit of pure mischief, and committing great havoc when the cherries, plums, peaches, apricots and other soft summer fruits are ripe. Cultivation paddocks suffer too from the depredations of this species, especially when the maize is just formed in the cobs.

Its range extends throughout Eastern New South Wales, Victoria, and the south-eastern portions of South Australia and Tasmania. I have previously pointed out* that specimens from



ROSE-HILL PARRAKEET.

the latter island may be distinguished by the conspicuously larger white cheek patch, and may now add also by the richer and darker scarlet head and breast, the latter of which extends lower down the body than it does in birds from the mainland. Should it be necessary to distinguish this southern race, I would propose for it the name of *Platycercus diemenensis*.

Individual variation is not uncommon. In the Australian Museum Reference Collection

are specimens which have the feathers of the back and scapulars margined with almost pure yellow, and the feathers on the centre of the lower breast and abdomen washed with scarlet. One of these specimens I obtained at Blacktown in October, 1893, which is only a few miles from Rose-hill, near Parramatta, New South Wales, from whence this species received its vernacular name. There is a beautiful example in the mounted collection obtained by Mr. Henry Young at Foster, New South Wales. It has the hind-neck, rump, upper tail-coverts, sides of the breast, abdomen and flanks rich canary-yellow, scapulars and back white, with canary-yellow margins to all the feathers, wings white with a faint bluish wash, tail-feathers white, the central pair tinged with yellow. There are two other somewhat similarly plumaged specimens, but of a more pronounced greenish-yellow shade; one was procured by Mr. James McDonald at Braidwood; the other is the skin of a young bird taken by Mr. E. Woods from a nesting-place at Litledale, six miles from Cootamundra, and was kept in confinement, from which it escaped, and after two years freedom was eventually shot by the donor.

An abnormally plumaged mounted specimen of *Platycercus eximius* (the so-called *Platycercus ignitus*, Leadbeater) was picked up dead in the Victoria Park, Newtown, near the University of Sydney. The lengthened upper mandible, the much worn quills and tail-feathers, bear evidence that it was an escaped cage bird. It has the upper and under parts red, scapulars and feathers on the upper portion of the back black with narrow reddish margins, cheeks white, vent and under tail-coverts white, the latter having a faint reddish subterminal cross-bar; the quills and tail-feathers worn, abraded, imperfect, and having a washed-out appearance.

The Rose-hill Parrakeet is the only species of the genus *Platycercus* now inhabiting the vicinity of Sydney, being more frequently met with between Blacktown and Penrith, but as during the last few years these districts have been gradually denuded of their timber, these birds are not so freely distributed as they once were, and will eventually be driven away; they are common, however, on parts of the Blue Mountains and the districts beyond.

* Town and Country Journal, Sydney, 11th April, 1896

In South-eastern Australia this species is frequently seen in captivity. If obtained young it soon learns to whistle and clearly enunciate short sentences. Among many bird pets I had a Rose-hill Parrakeet for many years. It was very affectionate, and quickly recognised my voice on hearing it, could talk and whistle well, and could imitate to perfection the notes of the Rufous-tailed Bronze Cuckoo (*Lamprolaima lalage*). One day it escaped, and was lost for three days, but eventually I located it in a neighbour's garden, from its plaintive imitation of the Cuckoo's note. It was in a large geranium, and was glad to jump on to my hand and be restored to its cage and food.

Mr. E. H. Lane writes me:—"Sets of eggs of *Platycercus eximius* vary from five to nine in number. The latter number was taken by my son Leslie on the 18th November, 1905, at Orange, New South Wales."

Mr. G. A. Keartland, of Melbourne, writes me as follows:—" *Platycercus eximius* in the southern portions of Australia and Tasmania is certainly the handsomest and best known Parrakeet. In Victoria these birds are to be seen or heard in cages in almost every street, as they are so easily procured, and are general favourites. They are most numerous in agricultural districts, where they thrive on the grain found in stubble fields or the seeds of thistles. They usually breed in holes in trees, but I found six young ones in a hollow stump not four feet high."

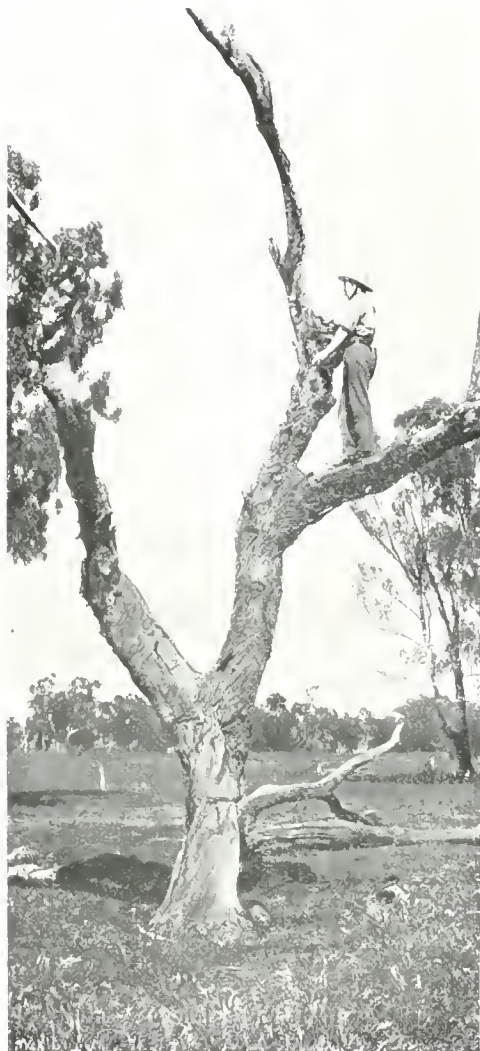
From Glenorchy, Tasmania, Mr. M. Harrison writes me:—"The 'Rosella' Parrakeet (*Platycercus eximius*) is common throughout Tasmania where the country is fairly open and grassy, but frequently draws an abrupt line beyond which, for some reason, it is never seen. Gould observed this, and states that he never saw it south of the Derwent, but it is now, and has been as long as I can remember, plentiful on both banks about Austin's Ferry, and I have never seen any between that place and Hobart, although plentiful on the opposite side of the river. At Austin's Ferry it still breeds in fair numbers, although the Starling is gradually taking possession of every nesting-place, to the exclusion of native birds of similar nesting habits. The clutch is generally from six to eight. On one occasion a friend and myself found no less than four nests of this Parrakeet containing eggs, and one of the Tree Martin (*Petrochelidon nigricans*), in the same tree, a Eucalypt."

For the purposes of breeding it resorts to a hollow limb, trunk, or stump of a tree, the nesting-place varying from a few feet to forty or fifty feet from the ground.

The eggs vary from five to nine in number for a sitting, and in shape from elliptical to rounded oval, pure white, the shell being fairly close-grained and smooth, some are dull and lustreless, others have a slight gloss. A set of six taken by Mr. J. Gabriel, at Myrning, Victoria, on the 12th November, 1892, measure:—Length (A) 1.03 × 0.92 inches; (B) 1.15 × 0.9 inches; (C) 1.08 × 0.87 inches; (D) 1.08 × 0.88 inches; (E) 1.06 × 0.89 inches; (F) 1.01 × 0.84 inches. A set of five received from Mr. S. Robinson, and taken at Lewis Ponds, New South Wales, on the 22nd October, 1897, measures:—Length (A) 1.01 × 0.9 inches; (B) 1.09 × 0.88 inches; (C) 1.08 × 0.88 inches; (D) 1.01 × 0.89 inches; (E) 1.02 × 0.87 inches. Another set of six taken by Mr. Gabriel from a cleft in a hollow trunk of a *Casuarina*, about eight feet from the ground, at Werribee, Victoria, on the 12th October, 1901, measure:—Length (A) 1.04 × 0.82 inches; (B) 1.02 × 0.84 inches; (C) 1.01 × 0.83 inches; (D) 1 × 0.83 inches; (E) 1 × 0.87 inches; (F) 1.07 × 0.87 inches. A set of seven received from Mr. E. H. Lane on the 19th October, 1900, and taken by Mr. C. Spicer at Lewis Ponds, about twelve miles from Orange, New South Wales, measures:—Length (A) 1.01 × 0.91 inches; (B) 1.01 × 0.9 inches; (C) 1.03 × 0.9 inches; (D) 1.03 × 0.88 inches; (E) 1.03 × 0.89 inches; (F) 1.05 × 0.87 inches; (G) 1.05 × 0.92 inches.

In Mr. Chas. French, Junr.'s, collection I saw a set of six eggs of this species that were taken from a deserted nest of *Pomatostomus temporalis*.

During a visit to Cobborah Station, Cobborah, New South Wales, about two hundred and forty miles north-west of Sydney, I found these birds fairly plentiful in October, 1909. Mr. Thos. P. Austin climbed to many of their nesting-places, but nearly all contained incubated eggs or young birds. With a few exceptions the trees selected were all on the banks of the Talbragar River. On the 15th October Mr. Austin cut out a nesting-place in a hollow limb of a tree about twenty-two feet above the river, and found two recently hatched young, in down,



AT A ROSE-HILL PARRAKEET'S NESTING-PLACE.

and two chipped eggs. In another nesting-site examined on the same day he found broken eggs and some feathers; evidently the sitting bird had been caught by one of the large Lace Lizards (*Varanus varinus*), which are common in the locality. Similar evidence of the sitting bird and eggs being destroyed was also found in another nesting-hole examined. On the 18th October Mr. Austin climbed to a nesting-place in a hollow branch of a low dead tree, and found it contained seven newly hatched young. Another nesting-place in a hollow limb of a green tree thirty-five feet from the ground, contained six eggs, some of which were chipped and on the point of hatching; and in another tree a nesting-place chopped out revealed a single fresh egg. On one occasion, Mr. Austin informed me, he chopped out a nesting-place in a branch of a tree overhanging the Talbragar River, and had placed his handkerchief over a set of seven fresh eggs to protect them from the chips, when suddenly the branch they were in broke off, and it was precipitated, together with the set of eggs and handkerchief, into the river.

The figure of the nesting-place of the Rose-hill Parrakeet is reproduced from a photograph I took on the 12th October; it contained seven newly hatched young.

Birds that breed in holes in the ground, or in trees, are not so secure as one would imagine they would be in such situations, away from observation and usually light. They too frequently fall an easy prey to reptiles or other enemies, for there are no means of escape from the ends of tunnels in the earth, or at the extremities of holes in trees, and too often eggs or young, together with the sitting birds, are captured and devoured, chiefly by different species of lizards. As I have pointed out elsewhere, the eggs of the Diamond Bird (*Pardalotus punctatus*) are, about Roseville, frequently eaten by the small Spot-sided Lizard (*Egernia whitei*), and I have even seen the pendant domed nests of the Rock Warbler (*Origma rubricata*), when built under rocks and cave shelters, despoiled of their eggs by the Spiny-backed Water Lizard (*Physignathus lescuri*).[†] About Roseville and Lindfield the Blue-tongued Lizard (*Tiliqua scincoides*) was also a common robber of eggs from hens' nests, but the paddocks in these districts being cut up of late

* *Antea*, Vol. I, p. 315. † *Antea*, Vol. II, p. 227.

years for residential purposes, and the consequent clearing of scrub and forest lands, has done much to do away with these pests. While near the coast, however, the predatory lizards referred to are usually of small size; inland the more common egg-eating species is the Lace Lizard (*Varanus varius*), generally termed "Iguana," is when full grown from seven to eight feet in length, the greater portion consisting of tail, the body of a medium-sized one averaging two feet in length and the tail three feet, but while the former is in comparison very



LACE LIZARD, A GREAT DESTROYER OF EGGS.

broad, the latter is thin and attenuated. When young they are very active, but when full grown are inclined to be extremely fat, lethargic and can hardly be shifted with a stick or stone, especially after a hearty meal. Every bushman knows these reptiles, for the oil extracted from their bodies when rendered down is supposed to be very efficacious in the cure of rheumatism. They haunt the ground, trees—principally dead ones—and the margins of swamps and dams, and feast on everything that comes in their way, but principally on small mammals, birds and eggs. They are fairly numerous on Cobborah Station, Cobbora. In that neighbourhood they chiefly frequent dead timber, and feed largely on the eggs of the different species of Cockatoos, Lorikeets and Parrakeets, and various Geese and Ducks that breed in hollow limbs of trees, seven eggs of a Maned Goose, or "Wood Duck," that disappeared from a hollow limb of a tree near the homestead during my stay there in October, 1909, being attributed to the ravages of this species. Two nesting-places of the Rose-hill Parrakeet (*Platycercus eximius*) were also discovered during that month with the eggs broken and eaten, and a bunch of feathers all that remained of the sitting birds. The accompanying figure of one of these Lace Lizards is reproduced from a photograph I took on Cobborah Station, on the 19th October, 1909; the lizard was a young one about five feet in length, extremely active, and Mr. Austin and I chased it from tree to tree before it got into a position suitable for photography.

Farther west about Gilgandra, Nyngan, Narromine, Warren and the Macquarie Marshes these lizards feast chiefly on the eggs of the Rose-breasted Cockatoo (*Cacatua roseicapilla*), Barnard's Parrakeet (*Barnardius barnardi*), the Red-vented Parrakeet or "Blue-bonnet," (*Psephotus hæmatorrhous*), and various species of water-fowl. I have seen a full set of Black Duck's (*Anas superciliosa*) and a set of Coot's (*Fulica australis*) eggs that were taken intact from the bodies of these reptiles; in the latter the purplish-black spots and markings had almost entirely disappeared.

Young birds are much duller in colour than the adults, the feathers on the crown of the head and nape are dull green, the white cheeks smaller and the scarlet feathers on the chest less in extent, and there is a white spot on the inner webs of the quills forming a bar on the wing. Wing 5.7 inches.

September and the four following months constitute the usual breeding season of this species in South-eastern Australia.

Of *Platycercus splendidus*, Gould, I regret that we have only three adult and unlocalised specimens in the Old Collection, of which nothing is known of their history. A young female I shot on the Clarence River has the rump, upper tail-coverts and the lower portion of the abdomen and the flanks pale greenish-blue, and similar to those portions of the plumage of *Platycercus pallidiceps*, but the forehead and crown of the head is like that of the young of *P. eximius*, and not yellow as is shown in Gould's upper figure of *P. splendidus* in his folio edition of the "Birds of Australia." There is a similar young female, procured by Mr. R. Grant at Lithgow, and an unlocalised adult male of *P. splendidus*, but differing in plumage in having the greenish-yellow rump, upper tail-coverts and abdomen of *P. eximius*.

Platycercus icterotis.

YELLOW-CHEEKED PARRAKEET

Psittacus icterotis, Temm., Trans. Linn. Soc., Vol. XIII., p. 120 (1821).

Platycercus icterotis, Gould, Bds. Austr., fol. Vol. V., pl. 29 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 58 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 534 (1891); Sharpe, Handl. Bds., Vol. II., p. 38 (1900).

ADULT MALE—*General colour above green: feathers of the upper back and scapulars with blackish centres, those of the hind-neck black, margined with yellowish green, some of them partially sub-marginally bordered with dull scarlet: upper wing-coverts dark blue, with a black patch across the lesser and median series; the inner greater wing-coverts green with blackish centres: primaries dark blue on their outer, blackish on their inner webs: secondaries green on their outer webs blackish on their inner webs, except the inner series, which are black margined with green on their outer webs: four central tail-feathers green, the remainder greenish-blue at their base, pale blue on their apical half and tipped with white: checks yellow: forehead, crown of the head, nape, sides of the neck, all the under surface and under tail-coverts scarlet: "bill light horn colour: legs and feet dull ashy-brown: iris blackish-brown"* (Gould). *Total length 10.75 inches, wing 5.3, tail 5.8, bill 0.6, tarsus 0.6.*

Distribution—Western Australia.

THE Yellow-cheeked, or Earl of Derby's Parrakeet, or "Rosella" of the inhabitants of Western Australia, is freely distributed throughout the south-western portions of that State. Collecting on behalf of the Trustees of the Australian Museum, in December, 1868, and January, 1869, Mr. George Masters procured a fine series of these birds in all stages of plumage. At Broome Hill Mr. Tom Carter informs me it is very common, and that during the latter half of 1908 many of its eggs were destroyed in the vicinity by the felling of trees, preparatory to burning off and utilizing that portion of the country for wheat lands.

Specimens labelled as adult females are dull green above, with dark brown centres to the feathers of the hind-neck, back, and scapulars, a band on the forehead dull scarlet: sides of the head and ear-coverts dull yellowish-green: all the under surface dull green with broad dull scarlet margins to the feathers of the fore-neck and breast; abdomen and under tail-coverts scarlet. Wing 5.2 inches.

Individual variation is not uncommon in this species. An adult male in the Australian Museum Collection obtained by Mr. George Masters at King George's Sound, in March, 1869, has the tips of the feathers of the hind-neck, upper back and the scapulars margined with scarlet.

the feathers of the rump and the upper tail-coverts are washed with olive-yellow and some of them tipped with dull scarlet, as are also a few of the yellow cheek feathers. Another immature example has the feathers of the back and scapulars black margined with ashy-blue, and some of the anterior cheek feathers indistinctly tipped with dull blue.

From Broome Hill, South-western Australia, Mr. Tom Carter writes me as follows:—"The Yellow-cheeked Parrakeet (*Platycercus icterotis*) is a common bird throughout the south-western district of Western Australia, and especially so about Broome Hill. They become very tame about a homestead, and enter stables, chaff rooms, etc., to pick up stray corn, and turn over horse droppings like Sparrows in their quest for food. They commence to lay at the end of August, or early in September, and three to five eggs appear to form a clutch. The laying season must extend over a considerable time, as young birds have been constantly noted in the nests in the latter part of December. I knew of five young birds being taken from the nest on the 16th December, 1907. Two very remarkable varieties were shot near Katanning in 1906, the whole plumage being white and sulphur yellow. If I remember rightly the head and body were white and wings yellow. I have secured several specimens with the feathers of the mantle broadly edged with red, as much as an eighth of an inch wide, the ends of the scapulars and also the rump feathers and upper tail-coverts, especially the last, showing much red. They appear to correspond with the description of *Platycercus xanthogenus*, Salvadori, but to me they seem like well matured birds of *P. icterotis*."

Gould, referring to *Platycercus icterotis*, remarks:—"The eggs, which are white and six or seven in number, are eleven lines long and nine and a half lines broad; they are deposited in the holes of large trees without any nest."

Young birds are green above and below, the outer series of the lesser and median upper wing-coverts, the primary coverts, and the outer webs of the primaries are dull dark blue, the remainder of the wing green; feathers of the rump tipped with dull scarlet; tail as in the adult; feathers of the forehead, sides of neck, breast and abdomen tipped with dull scarlet; under tail-coverts dull yellow washed with scarlet. Wing 5 inches. In their progress towards maturity the dull scarlet tips to the feathers of the forehead extend also to those of the crown of the head, nape and under parts; centre of the cheeks yellow, some of the feathers below the eye dull scarlet.

Genus BARNARDIUS, *Bonaparte*.

Barnardius barnardi.

BARNARD'S PARRAKEET.

Platycercus barnardi, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 283 (1826); Gould, Bds. Austr., fol. Vol. V., pl. 21 (1848); *id*, Handbk. Bds. Austr., Vol. II., p. 40 (1865).

Barnardius barnardi, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 558 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 38 (1900); Salvad., Ibis, 1907, p. 312.

ADULT MALE.—*Forehead red; crown of the head, ear-coverts and cheeks redditer-green, the anterior portion of the latter blue; band on the nape dull bluish-brown; a band around the hind-neck, broader at the sides, yellow; scapulars and back dull greyish-blue; a band down the centre of the upper wing-coverts, rump and upper tail-coverts redditer-green washed with yellow; lesser and median upper wing-coverts, the primary coverts and outer webs of the primaries rich deep blue, the outer webs of the outer secondaries blue, all the remainder and tips of the innermost series green, inner webs of quills blackish; central pair of tail-feathers green passing into blue towards the tips, the next on either side green, dark blue on the outer web towards the tip, which is pale blue, the remainder*

dark blue at the base, pale blue on their apical half; all the under surface and under tail-coverts verditer-green, the centre of the breast crossed with a more or less perfect broad orange-yellow band; bill whitish-horn colour, the lower mandible bluish-horn colour; legs and feet greyish-black; iris blackish-brown. Total length in the flesh 14 inches, wing 6·5, tail 7·5, bill 0·8, tarsus 0·75.

ADULT FEMALE.—Smaller and duller in plumage than the male, the back greenish and the blue more extended over the cheeks. Wing 6 inches.

Distribution—Southern Queensland, New South Wales, Victoria, South Australia.

BARNARD'S Parrakeet, or "Buln Buln" as it is more frequently called in New South Wales, is widely distributed throughout the southern portions of Queensland, Central and Western New South Wales, Western Victoria, and the eastern portions of South Australia, Mr. Edwin Ashby obtaining it as far south as Saddleworth, seventy miles to the north of Adelaide, Mr. George Masters procured specimens at the Flinders Range, and Dr. A. M. Morgan noted it common at Port Augusta. In New South Wales I met with it on the Mehi and Gwydir Rivers in November, 1897, breeding in trees along the river banks, and in Coolibah trees dotted over the plains. One pair had taken up their quarters in a Coolibah tree, just outside the garden of Mr. C. J. McMaster's residence, "Wilga," about three miles from Moree, the nesting-place being in a hollow in the trunk of the tree, and about twenty feet from the ground. In October, 1905, in company with the late Mr. J. A. Thorpe, we found this species unusually plentiful on the Castlereagh River, about sixteen miles to the north of Coonamble. Although they were usually met with in pairs, small flocks of four or five individuals were not uncommon, either feeding on the various seeds of grasses or herbaceous plants, or on the recently stacked wheat sheaves in the cultivation paddocks, and many specimens were obtained. *Calopsittacus nove-hollandic* and *Psephotus haematorrhous* and the present species were all equally common, as they generally are, throughout the Central and Western Districts of New South Wales.

In a large series of specimens there is not much individual variation, except in the yellow collar around the hind-neck; in some examples it is entirely broken in the centre by verditer-green feathers, and in females especially it is often as much orange in the centre as yellow. The band across the centre of the breast may be yellow or intermingled orange and yellow, and either a well defined band or only a central patch.

For an opportunity of examining an instance of xanthochroism in a living example of Barnard's Parrakeet, I was indebted to Mr. H. B. Bradley, a Trustee of the Australian Museum. This bird, which I saw at Mr. Bradley's office on the 18th April, 1904, was, he informed me, the property of Mr. A. L. Vivers, of North Sydney. It was remarkably tame, and had the entire plumage creamy-yellow, except a dark scarlet band on the forehead and some scarlet feathers behind the eye and on the nape; primaries and under surface of wing white; tail yellowish-white. Mr. Vivers subsequently informed me it was one of three taken by a shearer in September, 1901, from a nesting-place in a tree on Burrawong Station, near Forbes, New South Wales; the other young ones were in the normal plumage.

These birds live well in confinement, and soon learn to whistle and distinctly articulate short sentences.

The late Mr. K. H. Bennett, of Yandembah Station, wrote me:—" *Platycercus barnardi* is somewhat widely distributed through the timbered back country and the belts of timber bordering the rivers, but cannot be termed numerous, and is very rarely met with in the clumps of timber dotted over the plains. It breeds during the months of September and October, and lays four or five eggs, which are deposited in the hollow trunks or branches of Eucalyptus trees."

Mr. Robert Grant has given me the following note:—"I found the 'Buln Buln' Parrakeet (*Platycercus barnardi*) numerous on the Macquarie, Bogan and Castlereagh Rivers, New South Wales. While collecting on Byrock Station in October, 1886, large numbers of these birds used

to frequent a tank near the house. By the aid of a sieve and some maize scattered beneath and around it, and a string leading into an outhouse, where I had a good view of the birds, I secured as many as five or six at a single pull. One morning I trapped over thirty birds, but kept only about a dozen of the brightest plumaged birds, and let the others go."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray has kindly sent me the following notes:—"This part of New South Wales must be considered one of the strongholds of *Barnardius barnardi*, as no commoner bird exists on all the creeks which traverse it. It is quite an easy matter for anyone to follow one of these creeks down leisurely and find thirty or more nests in a day. It is, however, one thing to find them and another to get at their contents, as the eggs are often placed in the bole of the tree three or four feet from the entrance, which would necessitate half an hour's use of a tomahawk, often in an awkward position, and when easier ones are to be got such a labour is dispensed with. Nesting nearly always commences during the last week in August and continues till October; when the season is a late one nesting is often delayed a fortnight or so, and during a dry season which seriously limits the food supply, very few nest at all, and then only to rear small broods. The average height of the nesting-hollow is twenty feet, and the average depth two and a half feet. The birds are easily disturbed from the nest, unless the eggs are on the point of hatching or there are small young birds, when the old bird may often be caught on the nest. In 1907, when climbing to a Little Eagle's nest, I grasped a hollow limb below the Eagle's nest to pull myself up, and got rather a start when a Barnard Parrakeet flew out in my face; she proved to be sitting on eggs; there were two fresh eggs in the Eagle's nest. I have also found this bird's nest in the same tree in which a Kestrel had its nest, and two nests with young in a tree in which a Wedge-tailed Eagle was sitting on fresh eggs. Five eggs form a clutch, and this number will be found in eighty per cent. of the nests examined; six are rarely laid, four being much more frequent; they are simply deposited on the bare wood or woody dust natural to the hollow. These birds never congregate in flocks, but after the breeding season family parties may often be seen along the creeks, either on the ground feeding on seeds of various grasses and herbs, or else eating the seeds of various stunted *Acacias*, which grow on the rocky hills of the Barrier Range."

For the purposes of breeding it resorts to a hole in a trunk or branch of a tree, depositing its eggs on the decaying wood or dust usually found in these cavities.

The eggs are usually five, sometimes only four, and rarely six in number for a sitting, varying from oval to rounded-oval and an ellipse in form, pure white, the shell being close-grained, dull and lustreless. Three sets taken by Dr. W. Macgillivray measure as follows:—A set of four taken at Yanco Glen, eighteen miles north-west of Broken Hill, on the 11th October, 1903, measure:—Length (A) 1.12 × 0.88 inches; (B) 1.1 × 0.88 inches; (C) 1.08 × 0.9 inches; (D) 1.06 × 0.87 inches. A set of five taken at Campbell's Creek on the 13th October, 1906, measure:—Length (A) 1.13 × 0.93 inches; (B) 1.16 × 0.95 inches; (C) 1.15 × 0.93 inches; (D) 1.18 × 0.94 inches; (E) 1.16 × 0.95 inches. A set of four taken from a hollow in a Gum tree ten feet from the ground, at Sleeps Well Creek, forty-five miles north of Broken Hill, on the 23rd September, 1908, measure:—Length (A) 1.07 × 0.88 inches; (B) 1.17 × 0.91 inches; (C) 1.2 × 0.87 inches; (D) 1.15 × 0.93 inches.

Young birds are duller in plumage, the red band on the forehead paler; sides of the head brown; crown, nape and upper back brown slightly washed with green, the yellow collar on the hind neck narrower, paler, and having green feathers intermingled in the centre; cheeks brown, the tips of the feathers blue, under surface dull dingy yellow, all the feathers margined with green, the band across the centre of the breast being only slightly indicated with one or two scattered yellow or orange-yellow feathers.

August and the three following months constitute the usual breeding season of this species in New South Wales and Victoria. On the 7th October, 1892, I saw two clutches of five young birds in each in M. Octave Le Bon's shop, which had been just taken from the nesting-place at Cobar, New South Wales, and although apparently only about four weeks old, and having soft fleshy-white bills, were able to feed themselves. In March, 1896, Mr. James Ramsay informed me that this and other species of Parrakeets were then breeding about Cobar, having missed the previous ordinary season on account of the drought. At Narrabri, on the 9th November, 1896, I saw young birds that had been taken from the nesting-place that day. In South Australia the breeding season must commence earlier, for on Yorke's Peninsula, South Australia, Mr. W. White informs me he found newly fledged young on the 20th August, and at Port Augusta Dr. A. M. Morgan found a nesting-place on the 14th August, 1910, containing young.

Barnardius semitorquatus.

YELLOW-COLLARED PARRAKEET.

Psittacus semitorquatus, Quoy et Gaim., Voy. de l'Astrol., Zool., tom. I., p. 237, pl. 23 (1830).

Platycercus semitorquatus, Gould, Bds. Austr., fol. Vol. V., pl. 19 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 42 (1865).

Barnardius semitorquatus, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 559 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 38 (1900).

ADULT MALE.—*General colour above green, the inner upper wing-coverts and the secondaries like the back, the outer wing-coverts yellowish-green, most of the lesser series bluish-green; primary coverts dark blue, blackish at their tips; primaries blackish on their inner webs dark blue on the outer, the outer web of the first primary with an ashy shade, and which extends to the apical portion of the second, third and fourth primaries; central pair of tail-feathers green, bluish towards their tips, the remainder dark blue on the basal portion of their outer webs, their inner webs blackish and washed with green on both webs, which decreases in extent towards the outermost feather, apical portion of the feathers pale blue; head and nape dull black; on the forehead a crimson-red band; cheeks blue, a broad collar on the hind-neck yellow, followed on the lower portion by a narrow black line; foreneck and chest green, some of the feathers on the former having a slight bluish shade; breast green or yellowish-green, in some specimens crossed with a broad yellow band; abdomen and under tail-coverts yellowish-green; bill bluish horn-colour; legs and feet grey; iris, hazel* (Carter). Total length 16 inches, wing 7.5, tail 9, bill 0.92, tarsus 0.92.

ADULT FEMALE.—*Slightly duller in plumage than the male.*

Distribution—Western Australia.

AS pointed out by me in the "Proceedings of the Linnean Society of New South Wales," there is a great variation in the adult plumage of the present species. Quoy and Gaimard in the "Voyage de l'Astrolabe," Gould, in his folio edition of the "Birds of Australia," and Count Salvadori in Volume XX. of the "Catalogue of Birds in the British Museum," all agree in describing the lower breast as light green or yellowish-green. Dr. E. P. Ramsay, in his "Catalogue of Birds in the Australian Museum," describes this part as deep yellow. Three adult specimens with a broad yellow band across the lower breast, were also exhibited by me; one, an adult male obtained by Mr. George Masters at King George's Sound, Western Australia, in January, 1869, and an adult female and male obtained by Mr. T. Carter at Broome Hill, South-western Australia, in January and February, 1907. Also two adult

* Abstr. Proc. Linn. Soc. N. S. Wales, p. ii., (27th Aug., 1909).

males with the lower breast yellowish-green, the former procured by Mr. Carter in the same locality in July, 1906, and the latter the skin of an adult male bird, which Mr. G. A. Keartland, of Melbourne, had kept in confinement for ten years, the latter specimen being furthermore distinguished by the broadest red frontal band I have ever seen in this species. Not only had the specimens exhibited this broad yellow band across the lower breast, but others in the mounted collection of the Australian Museum do also. It is apparently common to both sexes, but is only found in fully adult birds, with the feathers of the head black, and a well defined yellow collar on the hind neck. An adult male from the Darling Range, received on loan from the Trustees of the Western Australian Museum, Perth, has a few scattered yellow feathers across the lower breast. The amount of red, too, on the forehead, even in very old birds, is extremely variable, and the wing-measurement varies from 7.3 to 7.7 inches.

The breast of *Barnardius semitorquatus* is not shown in either of Gould's figures in his folio edition of the "Birds of Australia," and although he did not originally describe *B. sonarius*, he points out the yellow band across the lower breast as a character to distinguish it from the former species.

Mr. George Masters obtained a fine series of these birds in Western Australia, while collecting on behalf of the Trustees of the Australian Museum at King George's Sound, in March, 1866, and again at Mongup, Salt River, in January, 1869. Mr. Masters informs me he has shot many of these birds for the pot, and has often enjoyed a savoury stew made from their bodies, but a dozen or more would be obtained in the duller livery of young birds, with dark brown heads, to one fine full-plumaged adult male.

In sending a skin of a fine old adult male for examination, Mr. G. A. Keartland wrote me:—" *Barnardius semitorquatus* is restricted to the southern portion of Western Australia, and is the largest species of the genus. These birds vary considerably in plumage. Whilst some are highly coloured, with a broad scarlet frontal band, others have only a few red feathers near the base of the upper mandible. In the majority of cases the breast is pale green, but occasionally a few yellow feathers are visible amongst the green. The specimen sent I previously had alive for ten years, and it was thus marked when I first purchased it, but it never varied in the extent of yellow or green as long as it lived."

From information sent me by Mr. Tom Carter, I have extracted the following:—" *Barnardius semitorquatus* is exceedingly common in the south-western portion of Western Australia, and particularly along the coast hills in summer. The red frontal band is very pronounced and brilliant in many birds, and I have one skin with the black head feathers immediately behind the frontal band tipped with green. They are most destructive birds in orchards, and have an equal liking for fruit ripe or unripe. The birds are very wary in the nesting season, retiring from the haunts of man. I saw fledged young at Broome Hill on the 20th November, 1908."

Mr. Edwin Ashby, of Blackwood, South Australia, writes me:—" *Barnardius semitorquatus* was very common at Etipup, Western Australia, in June 1889. I saw a sackfull brought in from a field strewn with poisoned wheat. They are locally called in Western Australia the 'Twenty-eights,' from the whistling cry they make."

Gould remarks:—" While on the wing its motions are rapid, and it often utters a note which, from its resemblance to those words, has procured for it the appellation of "Twenty-eight" Parrakeet, from the colonists, the last word or note being sometimes repeated five or six times in succession. The *Platyercus semitorquatus* begins breeding in the latter part of September or early in October, and deposits its eggs in a hole in either a Gum or Mahogany tree, on the soft black dust collected at the bottom; they are from seven to nine in number, and of a pure white."

* Gould, Handbk. Bds. Austr., Vol. II., p. 42 (1805).

A set of four eggs in Mr. Joseph Gabriel's collection are rounded ovals in form, white, the shell being close-grained, smooth and slightly lustrous. They measure:—Length (A) 1.18 × 0.98 inches; (B) 1.23 × 0.98 inches; (C) 1.23 × 0.97 inches; (D) 1.2 × 0.95 inches. A set of three eggs in Mr. G. A. Kearland's collection measure:—Length (A) 1.22 × 1.03 inches; (B) 1.3 × 1.1 inches; (C) 1.23 × 1.1 inches. A set of four eggs in the collection of Mr. H. L. White, of Belltrees, Scone, New South Wales, taken on the 12th November, 1900, measures:—Length (A) 1.28 × 1.1 inches; (B) 1.31 × 1.07 inches; (C) 1.27 × 1.08 inches; (D) 1.33 × 1.05 inches. The latter specimen is somewhat pointed at the smaller end.

Young birds are duller in colour, have more green feathers on the upper wing-coverts, the yellow band on the hind neck is narrower, the head is dark brown not black, the crimson-red band on the forehead ill defined, and the tips of the feathers behind it dull green; all the under surface duller than in the adult, and the band across the breast of a slightly more yellowish-green than the abdomen and upper tail-coverts.

Barnardius zonarius.

BANDED PARRAKEET.

Psittacus zonarius, Shaw, Nat. Miscel., pl. 657 bis.

Platycereus baueri, Gould, Bds. Austr., fol. Vol. V., pl. 20 (1848).

Platycereus zonarius, Gould, Handbk. Bds. Austr., Vol. II., p. 43 (1865).

Barnardius zonarius, Salvad., Cat. Bds. Brit. Mus., Vol. XX, p. 560 (1891); Sharpe, Handl. Bds., Vol. II., p. 38 (1900); Salvad., Ibis, 1907, p. 313.

ADULT MALE.—*Like the adult male of BARNARDIUS SEMITORQUATUS, but smaller and without the crimson-red band on the forehead, or occasionally only a few scattered red feathers, the yellow band on the hind neck narrower, and the general colour of the plumage above, fore-neck, chest, abdomen and under tail-coverts of a bluish-green. Total length 14 inches, wing 6.9, tail 8, bill 0.9, tarsus 0.8.*

ADULT FEMALE.—*Similar in plumage to the male, but slightly smaller.*

Distribution—South Australia, Central Australia, Western Australia, Northern Territory of South Australia.

BAUER'S, the "Port Lincoln," or Banded Parrakeet, the latter not a very distinguishing appellation, as *Barnardius semitorquatus* has also a yellow collar on the hind neck and sometimes a yellow band on the breast, is closely allied to this species. When compared with it the bluish-green shade is more pronounced on the upper wing-coverts, back, rump and upper tail-coverts. In a series of twelve adult specimens now before me, there are only a few scattered red feathers at the bases of the foreheads of three of them, and on one of these a very small red spot on one side of the forehead only. Some specimens have a few bluish-green feathers on the lower part of the yellow breast band.

It is widely distributed, being found in South Australia, Central Australia, where it was observed in many localities, and specimens obtained, by the Horn Scientific Expedition in 1894, the Northern Territory of South Australia, and in Western Australia. In the Australian Museum Collection specimens obtained by Mr. George Masters, at Port Lincoln, South Australia, in September, 1865, are of a slightly darker bluish-green than others procured by Mr. George Sharp at Boulder City, Western Australia, in June, 1901. Mr. C. G. Gibson has found it breeding in the latter State as far north as Mount Ida, in the East Murchison District.

Mr. G. A. Kearland of Melbourne sends me the following notes:—"The habitat of *Barnardius zonarius* embraces nearly the whole of the western half of the continent. They are found from South Australia proper to Tennant's Creek in the Northern Territory, and throughout the

southern portion of Western Australia. During the wanderings of the Horn Scientific Expedition in Central Australia, I shot many of all ages. Some were very highly coloured, whilst others were equally dull in plumage. Age or sex seemed to have no influence in this respect, as one of the brightest birds I secured was a nestling with its yellow bill. Adult males and females were also bright, but others of all ages and sexes were equally sombre. An old female a friend brought from Western Australia died recently, after ten years confinement in a cage. Instead of the beautiful sulphur band across its breast it had ten green spots dispersed through the yellow feathers. In a wild state they live on seeds and green food. The stomachs of some I shot were full of all manner of leaves and pulp."

Mr. C. G. Gibson writes me:—"At Mount Ida, in the East Murchison District, Western Australia, on the 23rd August, 1906, I took four considerably incubated eggs of *Barnardius zonarius* from a hollow in a White Gum. In September and October I found nesting places in hollows in White Gums along the sides of dry creeks containing young birds."

The eggs, four or five in number for a sitting, are deposited in a hole of a tree, usually a Gum tree; they are rounded oval in form, pure white, the shell being close-grained, dull and lustreless. A set of four partially incubated eggs taken by Mr. C. Ernest Cowle, at Illamurta, Central Australia, on the 16th July, 1895, measure as follows:—Length (A) 1.15 × 0.95 inches; (B) 1.17 × 0.93 inches; (C) 1.13 × 0.93 inches; (D) 1.18 × 0.95 inches. A set of four taken by Mr. C. G. Gibson on the 23rd August, 1896, at Mount Ida, in the East Murchison District, Western Australia, measure:—Length (A) 1.12 × 0.96 inches; (B) 1.14 × 0.98 inches; (C) 1.15 × 0.97 inches; (D) 1.14 × 0.96 inches.

In Central Australia the breeding season is influenced by the rains, generally it is as early as March, Mr. Kearthland noting a well fledged bird on the 12th May, the above described set being taken over three months later. At Mount Ida, in the East Murchison District, Western Australia, Mr. Gibson took incubated eggs on the 23rd August, 1906, and found nesting places containing young in September and October.

In North-western Australia a closely allied species, the Western Banded Parrakeet, *Barnardius occidentalis*,^{*} is found, the types of which are in the Australian Museum Collection and were procured in April, 1889, at Kurratha Station, thirty-six miles from Roeburne, by Mr. E. J. Saunders. This species, which ranges as far south, according to Mr. T. Carter, as Point Cloates, may be distinguished principally by its lighter green upper parts, yellowish-green feathers of the foreneck and upper breast, and its conspicuous lemon-yellow lower breast and abdomen.

Only one other species of this genus is known, *Barnardius macgillivrayi*,[†] inhabiting the neighbourhood of Cloncurry, north to Normanton, near the shore of the Gulf of Carpentaria, in the Burke District of Northern Queensland, the type of which is in the Australian Museum. It is allied to *B. barnardi*, but has no red frontal band, the back and interscapular region in both sexes are light green, the foreneck and upper breast yellowish-green, and the lower breast and abdomen rich yellow. This species was discovered by the late Mr. Alexander Sykes Macgillivray, after whom it was named, at Leilavale Station, on the Fullarton River, about thirty miles east of Cloncurry, and the skin was forwarded to me, as also have been many others, by his brother Dr. W. Macgillivray of Broken Hill, New South Wales. Dr. P. L. Sclater made the following remarks on this species in the *Ibis*,[‡] where it is beautifully figured:—"There can be no

^{*} North. Rec. Austr. Mus., Vol. II, p. 83 (1893). [†] North, Vict. Nat., Vol. XVII, p. 91 (1900.)

[‡] Sclater, *Ibis*, 1902, p. 610, pl. xv.

question about the distinctness of this beautiful addition to the Australian avi-fauna, but I thought it best to send the specimen to Count Salvadori, our supreme authority on the PSITTACIDÆ, who has favoured me with the following remarks:—‘*Platycercus* (I should say *Barnardius*) *macgillivrayi* is a perfectly good species. Unfortunately I do not possess the ‘Victorian Naturalist’ containing the original description, but from the specimen inspected it is quite obvious that, although allied to *B. barnardi*, *B. macgillivrayi* has good claims to stand as distinct. The principal characters are as follows:—There is no red frontal band, the forehead is more bluish-green, with a slight touch of yellow, the back is lighter green, the upper tail-coverts have a yellowish tinge, the breast is distinctly yellowish-green, and the abdomen extensively yellow. Beside *B. macgillivrayi*, there is another addition to be made to the species described in the Catalogue—*B. occidentalis*, North, ‘Records Austr. Mus.’ Vol. II., p. 83 (1893), allied to *B. zonarius*.’”

Genus PSEPHOTUS, *Gould*.

Psephotus hæmatorrhous.

RED-VENTED PARRAKEET.

Platycercus hæmatogaster (part), Gould, Proc. Zool. Soc., 1837, p. 89.

Psephotus hæmatogaster, Gould, Bds. Austr., fol. Vol. V., pl. 33 (1848).

Psephotus hæmatorrhous, Gould, Handbk. Bds. Austr., Vol. I., p. 62 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 561 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 38 (1900).

ADULT MALE.—*General colour above, including the greater portion of the head, the foreneck and chest pale brown, the upper tail-coverts washed with olive-yellow; lesser upper wing-coverts redditer-green, those on the extreme edge of the wing rich blue; outer median and greater wing-coverts blue, the inner median and greater wing-coverts reddish-chestnut, becoming paler on the outer webs of the inner secondaries, which are margined with olive; primary coverts, primaries and remainder of secondaries deep blue on their outer webs, blackish on their inner webs, with a greyish wash on the apical portion of the outer webs of the primaries; central pair of tail-feathers dull olive-green, the apical half of their outer webs and tips dull blue; the remainder dark blue at the base, white on their apical portion, all but the lateral feathers with a pale bluish wash on their outer webs extending nearly to their tips; lower portion of the breast and sides of the abdomen yellow; centre of the lower breast, abdomen, the vent and under tail-coverts crimson-red; bill whitish-horn colour, bluish at the base; legs and feet dark fleshy-grey; iris brown. Total length in the flesh 12 inches, wing 5.5, tail 6.5, bill 0.7, tarsus 0.7.*

ADULT FEMALE.—*Similar in plumage to the male, but smaller and with less crimson-red on the centre of the lower breast, abdomen and under tail-coverts.*

Distribution—Southern Queensland, New South Wales.

LIKE Gould I met with the “Blue-bonnett” on the Namoi River, in New South Wales, and in similar described country, a dry cracked loamy soil, covered with seeding herbage and grasses, between that river and the Nundewar Range, and assimilating so closely in colour to the birds, that usually one’s attention was first attracted to them when they rose and settled on a ring-barked dead tree. This was in November, 1896, and again in the same month of the following year I met with this species about eighty miles further north on the Gwydir River.

I can testify to the individual variation in both this and the following species, as already referred to by Dr. E. P. Ramsay* and Count Salvadori.† On the Castlereagh River, sixteen

* Austr. Mus. Cat., PSITTACI, p. 70 (1891).

† Cat. Bds. Brit. Mus., Vol. XX., p. 562-3 (1891).

miles north of Coonamble and three hundred and seventy eight miles west of Sydney, the late Mr. J. A. Thorpe and myself found the "Blue-bonnet" exceedingly numerous in November, 1905, and we succeeded in procuring a fine series of both adults and young. Some adult males had only the median upper wing-coverts chestnut-red, the inner greater coverts and innermost secondaries yellowish-olive, the former slightly tinged with chestnut-red; other adult males had the median and greater wing-coverts yellowish-olive, the former only washed with chestnut-red, or having dull crimson-red tips. In twenty adult specimens now before me, only two have the pronounced chestnut-red band down the centre of the wing, as is shown in Gould's upper figure of *Psephotus hematogaster*, in his folio edition of the "Birds of Australia." Some adult birds have the posterior portion of the ear-coverts pale brown, in others they are white or streaked with white. Two adult specimens obtained on the Castlereagh River have the upper parts very pale brown, and some of the feather on the crown of the head and nape dull chestnut-red, and in one mounted specimen the upper tail-coverts are stained with red.

The crops and stomachs of the birds examined contained only the seeds of various grasses and herbaceous plants. Both this and the Yellow-vented Parrakeet live well in confinement, and usually learn to whistle well. They are, however, remarkably spiteful and pugnacious to other inmates of an aviary. Mr. W. J. Banks, of Belmore, informed me that one day he purchased from a Sydney bird dealer two pairs of "Blue-bonnets" (*Psephotus hematorrhous*), two pairs of Many-coloured Parrakeets (*P. multicolor*), and one pair of Red-rumped Parrakeets (*P. hematotoxus*), which on returning home were placed in a cage together, while he went to the house to have his dinner. On coming out he caught one of the "Blue-bonnets" in the act of killing one of the Red-rumped Parrakeets, and which eventually died; he also found three of the Many-coloured Parrakeets dead on the floor of the cage. All had been killed in a similar manner by being bitten through the neck.

Mr. E. H. Lane, of Orange, New South Wales, writes me as follows:—"In 1888, at Wambangalang, I found two nests of the Red-vented Parrakeet (*Psephotus hematorrhous*) containing five eggs each, in the hollows of White Box trees. On this, and one or two other occasions only, have I seen this bird in that part. In September, 1899, I received a set of six eggs from near the Castlereagh River."

Mr. Percy Peir, of Marrickville, Sydney, writes me:—"I have had a number of the Red-vented Parrakeets, or 'Blue-bonnets' (*Psephotus hematorrhous*), and they are far more beautiful than the Yellow-vented Parrakeet in plumage. They generally arrive in poor condition, owing mainly to the long distances away from Sydney where they are caught, and a subsequent railway journey with lack of attention. The mortality is great, but the survivors live well so long as they are separated into true pairs, otherwise it will be disastrous, as these Parrakeets are most pugnacious, and when out to 'kill' play havoc with other inmates of an aviary. I lost a beautiful pair of Bourke Parrakeets and other small birds by the fighting propensities of the 'Blue-bonnet.' If possible to make their escape these birds will do so, so much do they dislike cage life. They require a considerable amount of the roots of freshly pulled grass, in addition to Canary seed, otherwise they will eventually die off. I have received birds from Warren, Byrock and Moree, New South Wales."

For the purposes of breeding it resorts to a hole in a tree, usually of a Eucalyptus or Casuarina. At the time of my visit to the Castlereagh River, in November, 1905, these birds were breeding in hollows in Wilgas and in the rung timber surrounding a dam, at a height varying from ten to forty feet from the ground.

The eggs are usually five to eight in number for a sitting, pure white, the shell being close-grained, smooth and almost lustreless. A set of seven taken from a hollow in a dead Belar

* Bds. Austr., fol. Vol. V., pl. 33 (1848).

(*Casuarina glauca*), at Narrabri, on the Namoi River, in October, 1896, measures:—Length (A) 0.99 × 0.76 inches; (B) 0.94 × 0.76 inches; (C) 0.98 × 0.77 inches; (D) 0.92 × 0.76 inches; (E) 0.96 × 0.78 inches; (F) 0.95 × 0.76 inches; (G) 0.99 × 0.77 inches. A set of six in Mr. Thos. P. Austin's collection, taken by Mr. B. C. Cox at Munnell Station, Armatree, New South Wales, on the 2nd September, 1909, in a green Box tree, fourteen feet from the ground and nearly eight feet from the entrance hole, are long oval in form, pure white, except where nest stained, the shell being close-grained, dull and lustreless and measures:—Length (A) 1.06 × 0.82 inches; (B) 1.02 × 0.8 inches; (C) 1.06 × 0.8 inches; (D) 1.05 × 0.82 inches; (E) 1.04 × 0.81 inches; (F) 1.03 × 0.81 inches. Five eggs of a set of six taken in the same locality by Mr. Cox, on the 9th September, 1909, measure:—Length (A) 0.98 × 0.78 inches; (B) 1 × 0.78 inches; (C) 0.96 × 0.78 inches; (D) 0.94 × 0.78 inches; (E) 1.03 × 0.81 inches.

Young birds are everywhere paler than the adults, the blue on the face and forehead is more circumscribed, there is a white spot at each side of the forehead, and the ear-coverts and lower portion of the cheeks are whitish; the lesser wing-coverts are blue and the median coverts yellowish-olive, more or less tipped with chestnut-red, and the greater coverts pale brown, slightly tinged with olive; the centre of the abdomen and the flanks are dull crimson-red with narrow pale yellow edges to the feathers; the under tail-coverts may be either uniform pale yellow or pale yellow centred with light crimson-red; all but the outer quills have a whitish spot about the middle of their inner webs. Wing 4.75 inches.

August and the four following months constitute the breeding season of this species. On the Castlereagh I found it engaged in the duties of incubation, and also obtained well-fledged young early in October, and at Narrabri I saw young birds taken from the nesting-place early in November.

Psephotus xanthorrhous.

YELLOW-VENTED PARRAKEET.

Platygeucus hematogaster (part), Gould, Proc. Zool. Soc., 1837, p. 89.

Psephotus xanthorrhous, Gould, Handbk. Bds. Austr., Vol. II, p. 63 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 563; Sharpe, Hand-l. Bds., Vol. II., p. 38 (1900).

ADULT MALE.—*Like the adult male of PSEPHOTUS HEMATORRHOUS, but with the lesser wing-coverts blue, and most of the median and greater coverts yellowish-olive instead of chestnut-red, the feathers of the foreneck and upper breast with pale yellowish shaft streaks, and the under tail-coverts of a uniform rich yellow, but occasionally more or less centred or tipped with dull crimson-red. Total length 12.5 inches, wing 5.1, tail 6.75, bill 0.7, tarsus 0.72.*

ADULT FEMALE.—*Similar in plumage to the male, but smaller and with less crimson-red on the centre of the lower breast and abdomen.*

Distribution.—New South Wales, Victoria, South Australia.

TAKING the extremes, as given in the above and the preceding description, one can readily recognise two distinct species, but judging from the series of specimens in the Australian Museum Collection, one will as frequently find examples combining the characters of the two species, as they will to either of the distinct forms *Psephotus hematorrhous* or *P. xanthorrhous*. Thus while in the Red-vented Parrakeet specimens are to be found with crimson-red under tail-coverts, and the wing streak more yellowish-olive than chestnut-red, so in the Yellow-vented Parrakeet will specimens be found with the under tail-coverts more or less centred or tipped with crimson-red, or the median upper wing-coverts tipped with chestnut-red. There

is, too, in some specimens a shade of verditer-green on the inner lesser wing-coverts. In common with *Psephotus hæmatorrhous* also, some of the feathers on the crown of the head of other examples are indistinctly tipped with dull chestnut-red.

Psephotus xanthorrhous is widely distributed. Gould records that Captain Sturt observed it in abundance at the Depot which is on Evelyn Creek, about eight miles off the main road, midway between Milparinka and Tibooburra, in North-western New South Wales; the late Mr. K. H. Bennett obtained many specimens, in accompany with Mr. W. Adams, on the Lachlan River, in June, July and August, 1883, and the former found it breeding freely during many years residence on Yandembah Station. In South-western New South Wales Dr. W. Macgillivray has found it breeding in the neighbourhood of Broken Hill; it is plentiful in the Riverina District, and there are specimens in the Australian Museum Collection obtained on the Murray River. It also occurs in Northern and Western Victoria, where it appears the more typical birds are found, that is with the larger and purer yellowish-olive wing patch, this colour also extending to the larger upper tail-coverts. It is numerous in some parts of South Australia. During a trip taken by Dr. A. M. Morgan from Port Augusta, one hundred miles to the north-west, to Mount Gunson, he found it where there were trees the commonest Parrakeet north of Port Augusta. A nest was found on the 30th July, 1900, in a hollow of a Myall, which the female was reluctant to leave, containing three fresh eggs, and another egg was taken from this nesting-place the following day. Two more nests were found in hollow Gums on Yultacowie Creek, one with five eggs just hatching, the other with five young birds. On the 12th August, at Mount Gunson, another nesting-place was found containing two young birds and one egg just hatching.

The late Mr. K. H. Bennett, of Yandenbah Station, wrote:—“*Psephotus xanthorrhous* is a rather common species, being met with wherever there is timber, although it passes the greater part of its time on the ground, over which, by a series of hops, it passes with extraordinary celerity. Usually it is met with in pairs, or in small flocks of five or six in number. Its food consists chiefly of various seeds, to which is added the nectar from the blossoms of several kinds of trees, but not those of any species of Eucalypt. The breeding season is during the months of September and October, and the eggs, four or five in number, are deposited in the hollow trunks or branches of trees.”

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray has sent me the following notes:—“*Psephotus xanthorrhous* is found sparingly throughout the district, during the breeding season in pairs and afterwards in families; they never flock like the Red-rumped Parrakeet of southern parts. They are early breeders, nests being found as early as July. Although in a wild state they seem very shy, Mrs. Brougham started feeding a pair that used to come about her garden at Poolamacca Station some years ago; they soon became quite accustomed to her, and were joined by some Barnard Parrakeets. In the spring of 1906 the “Blue-bonnets” disappeared for about two months, and then reappeared one morning at the accustomed time with a brood of young ones; these were at first very shy, but soon learned to come on to the verandah with the rest for their regular meal. These birds seldom nest in the Gums growing along the main creeks, but prefer a hollow in a Black Oak (*Casuarina*) on some small tributary watercourse, or in the Box trees which grow on flats in the scrub country. Their nests are often placed at a great depth from the entrance, as much as twelve to fourteen feet being noted. The nests of *Psephotus xanthorrhous* are usually found in scrub country in Box trees on the flats, in *Casuarina* (Belar) trees on the Pine ridges which traverse the scrub or which border the smaller creeks. In the spring of 1909 we found them breeding more freely than previously. The nests are usually low down, from three to fifteen feet from the ground; a deep hollow is usually chosen. Most of those we came across contained young birds, the eggs having been laid during August, mostly about the middle of that month. At Langawirra Station,

on the 29th September, Mr. W. McLennan and I found a nest full of young ones in a hollow in a *Casuarina*. They were nearly fledged, and differed from all others in approaching more nearly to *P. hematorrhous* in colouring, the under tail-coverts being red and the dark red wing patch being present as in the latter species, but not to such an extent; no doubt if one were to collect specimens from here to Hay and Narrandera, one would find a gradual murgence of one species into the other."

From Melbourne Mr. G. A. Kcartland writes me as follows:—"The Mallee country in the Wimmera District is the home of *Psephotus anthorrhous* in Victoria. The birds undergo very little change in plumage from the time they leave the nest to old age, and the sexes are indistinguishable by plumage or size. I have reared several nestlings, and although one is now twelve years old, it is exactly like a pair of young ones which died before they could feed themselves."

The nesting-place is in a hollow of a tree, the different species of *Casuarina* being more often selected, also in holes in Gum trees, and, as noted by Dr. Macgillivray, often a long way from the entrance, the eggs being deposited on the decaying wood or dust usually found in these cavities.

The eggs are more often five, occasionally only three, and sometimes as many as eight in number for a sitting. They vary from rounded-oval to an ellipse in form, pure white, the shell being close-grained and usually dull and lustreless. A set of five in the Australian Museum Collection, taken by the late Mr. K. H. Bennett on the 18th August, 1889, at Yandembah Station, in the Lachlan District, New South Wales, measures as follows:—Length (A) 0.86 × 0.72 inches; (B) 0.9 × 0.73 inches; (C) 0.88 × 0.73 inches; (D) 0.9 × 0.75 inches; (E) 0.84 × 0.73 inches. Another set of five taken by Mr. Bennett in the same locality on the 27th August, 1889, measure as follows:—Length (A) 0.93 × 0.77 inches; (B) 0.94 × 0.74 inches; (C) 0.88 × 0.76 inches; (D) 0.93 × 0.77 inches; (E) 0.91 × 0.76 inches.

August and the four following months constitute the usual breeding season of the Yellow-vented Parrakeet in New South Wales, but at Port Augusta, in South Australia, Dr. A. M. Morgan found on the 30th July, 1900, nesting-places with fresh eggs, incubated eggs and young birds.

From Cooper's Creek, South Australia, Count Salvadori has separated a paler form under the name of *Psephotus anthorrhous*, var. *pallidus*.

***Psephotus pulcherrimus*.**

BEAUTIFUL PARRAKEET.

Platygeucus pulcherrimus, Gould, Ann. and Mag. Nat. Hist., Vol. XV., p. 114 (1845).

Psephotus pulcherrimus, Gould, Bds. Austr., fol. Vol. V., pl. 34 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 67 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 564 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 39 (1900).

ADULT MALE.—*Forehead crimson; crown of the head and feathers extending down the nape and centre of the upper hind-neck brownish-black; scapulars and back brown; rump turquoise-blue, separated from the feathers of the lower back by a narrow black cross-band; upper tail-coverts greenish-blue tipped with black; the mesial lesser and median upper wing-coverts crimson; remainder of the upper wing-coverts brown with a blackish wash, the inner greater coverts and the innermost secondaries brown like the back; remainder of the secondaries blackish-brown; primaries brown, with a bluish-black wash on the basal portion of their outer webs, the apical portion of the outer primaries with a greyish wash; central pair of tail-feathers dull greenish-olive at the base, passing into blackish at their*

tips, the apical portion washed with blue more strongly on their outer webs; the next pair greenish at the base, pale blue on the centre and largely tipped with white, the remainder greenish-blue passing into blue at their tips and crossed in the centre with an irregular black band; feathers around the eye and at the upper part of the base of the lower mandible yellowish stained with red; sides of neck greenish-blue; throat and foreneck green, the feathers of the latter tipped with turquoise-blue; centre and sides of breast blue, the former with a greenish tinge; abdomen and under tail-coverts scarlet, the latter with narrow yellowish edges. Total length 11.5 inches, wing 5, tail 6.5, bill 0.55, tarsus 0.6.

Distribution—Queensland.

ALTHOUGH there are skins of this species unlocalised, but labelled "New South Wales" in the "Old Collection" of the Australian Museum, I have never met with it or heard of it being obtained in any part of the State. It was one of the species discovered by Gilbert, the able assistant of Gould, and described by the latter in the "Annals and Magazine of Natural History," in 1845. It must not be forgotten, however, in those early days, when Gilbert and Gould were in Australia, that New South Wales comprised the greater half of the eastern portion of the Australian Continent, and that Victoria was not separated as a distinct Colony until 1851, and Queensland not until 1859. Hence we find Gould referring to *Psephotus pulcherrimus* in his folio edition of the "Birds of Australia"† as "one of the novelties that has rewarded Mr. Gilbert's researches in New South Wales . . . the specimens shot were procured on the Darling Downs, where it was observed in small families feeding on the seeds of grasses, and other plants growing on the plains." In his "Handbook to the Birds of Australia,"‡ which was published in 1865, and consequently after Queensland had been separated from New South Wales, he refers to *P. pulcherrimus* as "an inhabitant of the upland grassy plains of Queensland." There is no question but many mistakes have in a similar manner occurred, especially where no locality is given, and New South Wales, since separation has taken place, has been erroneously recorded in the distribution of several species. No one could wish more than myself that the well named "Beautiful Parrakeet" was an inhabitant of New South Wales, and I should much like to see a properly authenticated and localised specimen.

I much regret being unable to give a description of the adult female, from the small series of these birds in the Australian Museum Collection. One of the specimens, probably a young bird, has the feathers around the eye more yellowish, and which extends in a narrow line above the scarlet band on the forehead, the lesser and median upper wing-coverts mingled brown, crimson, yellow and pale green; the scarlet feathers on the abdomen are paler and broadly margined around their tips with yellowish, and the under tail-coverts are pale yellowish-green, their basal portion centred with light scarlet.

The preceding description of the adult male is taken from a skin received by Dr. E. P. Ramsay, and collected by the late Mr. George Barnard on the Dawson River, Queensland, in 1880.

The following notes have been sent me by Mr. H. G. Barnard, of Bimbi, Duinga, Queensland:—"It is many years since I have seen *Psephotus pulcherrimus*. These birds were never plentiful in this part, only an odd one or two being procured, but in 1882 my brother Charles and I visited Fairfield Station, one hundred miles south of this, where we found the birds numerous, and here for the first time discovered their breeding habits. The bird drills a hole, resembling that of a Pardalote, in the large round *Termite* mounds on the ground, but though the entrance is small the egg cavity is large, as much as a foot in diameter. The eggs are deposited on the soft earth, from three to five forming a sitting. It is so long since I have seen *Psephotus pulcherrimus* I could not describe the female, which is quite unlike the male, being mostly of a brown colour."

* Ann. Mag. Nat. Hist., Vol. XV, p. 114 (1845). † Bds. Austr., fol. Vol. V., text opp. pl. 34 (1848).

‡ Handbk. Bds. Austr., Vol. II, p. 67 (1865).

A set of three eggs received from the late Mr. George Barnard, of Coomooboolaroo, Duaringa, Dawson River, Queensland, and taken in September, 1883, are rounded-oval in form, pure white, the shell being close-grained, smooth and slightly lustrous, and measure:—Length (A) 0·91 × 0·75 inches: (B) 0·9 × 0·78 inches; (C) 0·87 × 0·72 inches.

Psephotus multicolor.

MANY-COLOURED PARRAKEET.

Psittacus multicolor, Temm., Trans. Linn. Soc., Vol. XIII., p. 119 (1821).

Psephotus multicolor, Gould, Bds. Austr., fol. Vol. V., pl. 35 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 68 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 566 (1891); Sharpe, Handl. Bds., Vol. II., p. 39 (1900); Salvad., *Ibis*, 1907, p. 314.

ADULT MALE.—*General colour above green with a bluish shade, particularly on the feathers above the eye and the sides of the neck; a broad band on the nape chestnut-red; lower part of the back and the rump crossed by two black bands, separated by a band of light green; upper tail-coverts green, some of the smaller coverts dull red; scapulars and outer webs of the inner secondaries like the back; all the upper wing-coverts, except the outer greater series which are deep blue, of a slightly lighter green than the back, with a rich golden-yellow patch on the median series; remainder of the quills dark blue on their outer webs, blackish on their inner webs, except the apical third of the outer primaries, which have a greyish wash on their outer webs; central pair of tail feathers dark blue, with a pronounced greenish wash on their basal portion, the rest on either side green at the base, pale blue in the centre and largely tipped with white; the remainder similar, crossed with a blackish band at the base, the green increasing and the white decreasing towards the penultimate feather on either side, which is only very narrowly edged with white at the tip; a broad band across the forehead rich golden-yellow; cheeks, foreneck and breast green; abdomen dull scarlet-red, the bases of the feathers yellow; under tail-coverts yellow occasionally stained with red; bill bluish horn-colour, blackish at the tip; legs and feet dark muddy-grey; iris, blackish-brown. Total length in the flesh 12 inches, wing 5·5, tail 6·75, bill 0·58, tarsus 0·56.*

ADULT FEMALE.—*Much duller in plumage than the male, and the yellow band on the forehead not so well defined; general colour above dull greyish-brown, the feathers on the fore part of crown of the head and the hind-neck tipped with dull green; those of the back and scapulars centred with dull yellowish-olive; upper wing-coverts dull bluish-green, the greater series a clearer blue; the patch on the median series dull red instead of rich golden-yellow as in the male; cheeks, throat and foreneck dingy greenish-yellow; remainder of the under surface and under tail-coverts light green.*

Distribution—South-western Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

THE Many-coloured Parrakeet is a widely distributed species, inhabiting the South-western portion of Queensland, Central and Western New South Wales, North-western Victoria, South Australia, and as far north in Western Australia as the Gascoyne River. It is represented in the Australian Museum Collection by many examples, procured principally by the late Mr. K. H. Bennett, at Moolah, Central New South Wales, in June, July and August, 1883. Mr. K. Broadbent obtained specimens at Nonning, South Australia; the Horn Scientific Expedition met with it at water holes in different parts of Central Australia in 1894, and specimens were obtained at Reedy Hole and the Finke River. In 1896 the Calvert Exploring Expedition frequently saw examples between Cue and Lake Augusta, in Western Australia, but they were not found further north. In South Australia Dr. A. M. Morgan noted it very common, during a trip made in July and August, 1900, from Port Augusta to Mount Gunson, both in scrubs and Gum creeks.

Individual variation exists in this species, especially in the adult females, some having the underparts as above described, others having them stained with dull red or yellow, especially on the abdomen and thighs, or have the upper parts of a brownish-grey with hardly any tinge of dull yellowish-olive or green. All have the mesial wing-coverts dull red. Of adult males some of the feathers of the abdomen are intermingled yellow and orange-red. Of two I shot together at Woodside, near Coonamble, New South Wales, in October, 1905, one has the under tail-coverts pure yellow, the other has them yellow with narrow dull red cross-bars. Another specimen has the under tail-coverts washed with green, the latter of which is also found in the young stage. One immature male has some of the golden-yellow feathers on the forehead and the median wing-coverts washed with red. In some the dull red marking on the smaller upper tail-coverts, are in the form of a blotch, in others a well defined transverse bar.

The Many-coloured Parrakeet passes much of its time on the ground, and feeds principally on the seeds of various grasses and herbaceous plants, the contents of stomachs of specimens examined consisting chiefly of the former.

Mr. Bernard H. Woodward, Curator of the Western Australian Museum, Perth, kindly sent a large series of skins for examination procured in different parts of that State, and among other localities from Mount Magnet, Yandanooka and the Wongan Hills.

From Martickville, near Sydney, Mr. Percy Peir writes me as follows, under date 5th October, 1909:—"I have had quite a number of the Many-coloured Parrakeet (*Psephotus multicolor*) in confinement. They are very frail, seldom surviving two years of cage life, and are liable to die off at any moment without the slightest warning. The few that come into the Sydney market are generally in an emaciated condition, and beyond any hope of recovery. About three years ago I received from Mr. Bagust, a catcher, about a dozen young birds, and they all moulted out into the adult feather and lived well. They were caught a little distance out of Cobar, Western New South Wales, and arrived in good condition; a pair kept laid a couple of clutches of eggs in a hollow log in the aviary, and although time was sat out nothing resulted. When disturbed these Parrakeets emit a strong odour."

Mr. E. H. Lane, of Orange, writes me:—"I found *Psephotus multicolor* nesting at Wambangalang Station, nineteen miles from Dubbo, New South Wales, in October, 1882, in the hollow of a White Box tree. It contained merely two fresh eggs, no doubt only part of a set, but which I had to take as I had cut into the hollow. This is the only time I remember seeing this species there, and probably dry weather drove it in."

The late Mr. K. H. Bennett, of Yandembah Station, New South Wales, wrote:—" *Psephotus multicolor* is a very common species throughout the timbered back country, to which it is almost exclusively confined, being very rarely met with in the belts of timber bordering the rivers or in the clumps scattered over the plains. It is mostly seen in flocks of eight or ten individuals, spending the greater part of its time on the ground in quest of the seeds of the various herbaceous plants on which it feeds. It is by no means shy, and when disturbed merely flies to the low branch of some adjacent tree, returning again to the ground immediately one has passed the spot. The breeding season is during the months of September and October, and the eggs, five in number, are deposited in the hollow trunks or branches, usually of a *Eucalyptus* or *Casuarina*. The plumage of the sexes of the young, when leaving the nest, is similar, both having the red stripe on the wing; but during the first year that of the male changes to yellow, the female retaining the red shade. On this point I can speak with confidence, having repeatedly reared broods of these birds. This species is entirely independent of water."

Dr. W. Macgillivray sends me the following notes from Broken Hill, in South-western New South Wales:—" *Psephotus multicolor* is one of our commonest birds; it is found along all the watercourses throughout the district, either in pairs or small lots of six or seven after the breeding

season: the parent birds and their young broods. They pair off early and commence nesting operations in July, continuing throughout the three following months in a late season. I have taken eggs in November, the chief breeding months are, however, September and October. A small hollow is usually chosen in one of the Eucalypts which border our creeks, and the eggs laid on the bare wood or earthy matter natural to the hollow, at a distance of one to two feet from the entrance. The height from the ground varies from eight to eighty feet in actual measurements. The eggs are usually six in number, though one sometimes finds four or five. The female alone performs the task of incubation, and sits very closely when she has small young or the eggs are on the point of hatching, and I have known several instances when she could have been captured on the nest. They feed on the ground on the seeds of grasses and various other plants, and when disturbed fly up into the Gums, where the protective colouring of the female renders it very difficult to detect her. The male, however, with his brilliant green and scarlet livery, is a much more conspicuous object."

Relative to a trip undertaken by Dr. W. Macgillivray and Mr. W. McLennan, in September, 1909, to the north of Broken Hill, the former writes:—" *Psephotus multicolor* were breeding much more freely in the spring of 1909, especially in the Box trees growing in the scrub country, herbage being more plentiful than it had been for the previous four years, and seeding freely in great variety. Clutches of young varied from four to six, but in one instance a hollow contained seven. Incubation with this Parrakeet commences with the first egg laid. I opened the crop of one young one that Mr. McLennan accidentally dropped when examining a nestful, and found it very full of fine seeds, as fine as gunpowder, and could only wonder at the industry of the parent birds who could find and collect such seeds and fill the crops of seven young birds by 8 o'clock in the morning."

Mr. G. A. Kearnland, of Melbourne, has kindly supplied the following notes:—" *Psephotus multicolor* has a very wide range, being found wherever Mallee, Mulga or Saltbush is met with. These birds seem to remain in pairs throughout the year, as the only occasions on which I saw five or six together was when the old pair were accompanied by their brood. They are most affectionate in disposition, and on several occasions on which I have shot one of a pair the other has flown down to its dead mate and, although disturbed, returned two or three times to try and entice it away. They live well in confinement, and become very tame."

Dr. A. M. Morgan wrote me:—" I found *Psephotus multicolor* a common bird in scrubs and Gum creeks during a trip made from Port Augusta to the Mount Gunson District, South Australia, in July and August, 1900. One egg was taken on the 29th July at Mount Gunson, from a hole in a sand-bank, the female being shot at the nesting-place. In the same bank were holes made by *Cheramæca* and *Halcyon*, sps. Another nest was taken on the 11th August at Elizabeth Creek, in a hollow of a Gum tree, containing three fresh eggs. This nest contained one egg on the 7th August."

From Blackwood, South Australia, Mr. Edwin Ashby writes me:—" *Psephotus multicolor* is not found near Adelaide, but is very common in the north at Nackara, also at Mannum, South Australia. It was numerous in Western Australia, to the north and west of Coolgardie."

Mr. W. White, of the Reedbeds, South Australia, sent me a set of five eggs of this species, together with the following note:—" *Psephotus multicolor*, set of five, taken on Yorke Peninsula, South Australia, from a hole in a Mallee Gum, near Port Victoria, on the 30th August, 1893. The parent bird stayed on the nest while the hole was enlarged with an axe; then it would not leave until it was lifted off the eggs. This was the case in every instance."

From Broome Hill, South-western Australia, Mr. Tom Carter writes me:—" The only locality where *Psephotus multicolor* came under my observation was on the Gascoyne River, in 1887, when a dry season was prevailing. These birds used to drink at sheep's troughs in considerable numbers."

For the purposes of breeding it usually resorts to a hole in a tree, which, as Dr. W. Macgillivray has pointed out, may be eight, or anything between that and eighty feet from the ground, but at Mount Gunson, in South Australia, Dr. A. M. Morgan, on the 29th July, 1900, took a fresh egg from a hole in a sandbank, and shot the female at the nesting place. In the same bank were holes made by *Cherameca leucosternum* and a species of Kingfisher, probably *Halcyon pyrrhopygius*.

The eggs are from four to six in number for a sitting, and typically are almost globular in form, but occasionally swollen ellipses are found, pure white, the shell being close-grained, some sets being dull and lustreless, others having a slight gloss. A set of six taken by Dr. W. Macgillivray on the 10th October, 1903, at Gardiner's Creek, thirty miles north-west of Broken Hill, South-western New South Wales, measures:—Length (A) 0.86 × 0.76 inches; (B) 0.86 × 0.73 inches; (C) 0.84 × 0.75 inches; (D) 0.82 × 0.74 inches; (E) 0.92 × 0.72 inches; (F) 0.86 × 0.74 inches. Another set of six taken by Dr. Macgillivray on the 20th September, 1908, at Cox's Flat, Langawirra Station, sixty-five miles north from Broken Hill, measures:—Length (A) 0.84 × 0.73 inches; (B) 0.86 × 0.73 inches; (C) 0.85 × 0.71 inches; (D) 0.83 × 0.71 inches; (E) 0.87 × 0.72 inches; (F) 0.89 × 0.71 inches.

In South-eastern Australia eggs may be usually found from the end of July to the middle of October, the breeding season continuing until the end of November or early in December.

Psephotus hæmatonotus.

RED-RUMPED PARRAKEET.

Platycecus hæmatonotus, Gould, Proc. Zool. Soc., 1837, p. 151.

Psephotus hæmatonotus, Gould, Bds. Austr., fol. Vol. V., pl. 36 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 69 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 567 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 39 (1900); Salvad., Ibis, 1907, p. 314.

ADULT MALE.—*Back and scapulars dull green washed with blue; rump red; upper tail-coverts yellowish-green; upper wing-coverts and outer webs of inner secondaries bluish-green, the outer median series greenish-yellow; shoulder, primary coverts and outer webs of the primaries deep blue, the latter with a greyish wash on their apical portion; outer webs of outer secondaries blue with whitish margins; inner webs of all the quills blackish; central pair of tail-feathers bluish near the shafts and towards the tips, which are black; the remainder greenish at their bases, pale blue in the centre and largely tipped with white, the basal portion of their inner webs margined with dark blue, the white decreasing towards the outermost feather on either side, and the pale blue increasing, some specimens having these feathers entirely blue, in others narrowly edged on the outer web and tipped with white; head light emerald-green, the forehead and cheeks with a pronounced bluish wash; foreneck and upper breast yellowish-green; lower breast and abdomen yellow, greenish at the sides, some of the feathers having blue tips; the thighs washed with pale bluish-green; under tail-coverts dull white; under wing-coverts deep blue; bill bluish-horn colour; legs and feet greyish; iris light brown. Total length in the flesh 11.5 inches, wing 5.3, tail 6, bill 0.62, tarsus 0.55.*

ADULT FEMALE.—*Duller in plumage than the male, the head and upper parts grey washed with pale greenish-olive; rump and upper tail-coverts green; upper wing-coverts and inner secondaries like the back, the outer series of the lesser median-coverts washed with blue; cheeks, foreneck and upper breast olive-grey; the lower breast dull yellow, centre of the abdomen and under tail-coverts dull white, the latter washed with blue.*

Distribution.—Southern Queensland, New South Wales, Victoria, South Australia.

THE Red-rumped Parrakeet is the commonest species of the genus in South-eastern Australia. It is essentially a species frequenting the close proximity of water. The late Mr. Kendal Broadbent met with it at Charleville, on the Warrego River, in Southern Queensland. In company with Dr. E. P. Ramsay I found it very common in August, 1887, on the Bell and Macquarie Rivers, in New South Wales. Later on I met with it on the Namoi River in November, 1896, and on the Mehi and Gwydir Rivers in November, 1897, in the northern part of the State. During that time of the year, when it was exceedingly dry and hot, the Mehi River was little more than a chain of water-holes, and small flocks could be seen coming and going throughout the greater part of the day, either to drink or bathe, wading in until the lower half of the body was submerged, before dipping the head in, or beating the water with the wings. It passes most of its time on the ground, feeding on the seeds of various grasses and herbaceous plants, and it is when disturbed, or during flight, that the characteristic red mark on the rump of the adult male shows to advantage, and as Gould has aptly remarked, "appearing, as the bright sun shines upon it, like a spot of fire."

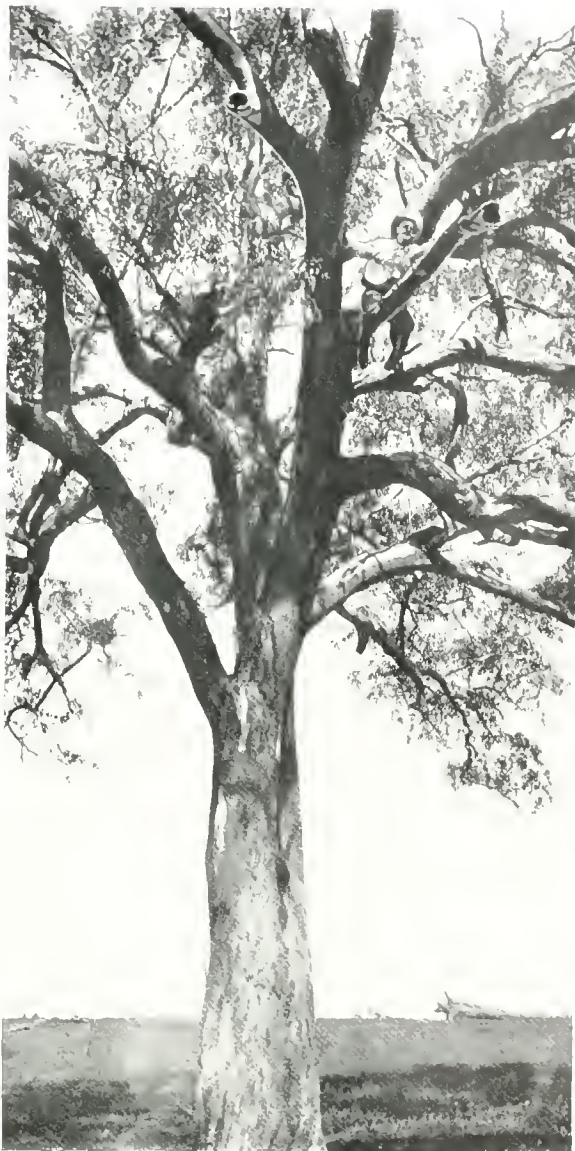
The wing-measurement of adult males varies from 5.1 to 5.45 inches. There is but little variation in a large series of these birds now before me, obtained in different parts of South-eastern Australia. Instances, however, of almost total and of partial xanthochroism are shown in examples obtained respectively by Mr. S. Hosie, at Dubbo, the late Mr. J. H. McCooey, at Warren, and by Mr. J. A. Daley, at Wagga Wagga, New South Wales, the former specimen exhibiting traces of the normal colouring on some of the quills and tail-feathers, and having all the under surface white, washed with yellow.

Mr. Robert Grant, Taxidermist at the Australian Museum, has handed me the following note:—"I found the Red-rumped Parrakeet (*Psephotus haematotus*) in nearly every locality I visited in the inland portions of New South Wales, and especially common at Sodwalls, Locksley, and Cow Flat near Bathurst. These birds are usually met with in pairs or small flocks feeding on the ground, and when disturbed fly to the nearest fence rail, or the limbs of a dead tree. They seem to prefer ring-barked timber or partly cleared country."

From Cobborah Station, Cobbara, New South Wales, Mr. Thos. P. Austin writes me as follows:—"Large flocks of *Psephotus haematotus* may be seen here during the winter, and the males are very pugnacious. About the beginning of September they pair off, and may be seen climbing over the trees examining all the holes therein for a suitable one to breed in. When this is discovered they remain in possession of it for about a month before the eggs are laid, the female cleaning it out, while the male is perched somewhere close by, and he appears to keep up a continuous chatter. The female appears solely to perform the task of incubation, and is mostly fed by the male. I have, however, often observed the former leave her eggs and go away with her mate feeding upon the ground, and both will return together in about a quarter of an hour. They are very fond of nesting in trees growing near water, and on hot days may often be seen bathing in the shallow pools or along the edge of a river. Unfortunately for themselves they appear to be a favourite food for many of the birds of prey."

Parrakeets frequently breed in company, sometimes several nests of the one species being found in the same tree. Although many nesting-places are found in holes in dead or ring-barked timber, the greater number select a hole in a green tree where a branch has rotted out. During a visit to Mr. Austin at Cobborah Station, in October, 1909, by far the larger number of all species were breeding in the trees on the banks of the Talbragar River, or in the trees on the adjoining river flats, seldom a bird being seen on the scrub-covered range country on the higher portion of the estate. As an instance of these birds breeding near one another, on the 15th October Mr. Austin climbed a Red Gum tree overhanging the Talbragar River, and found in a hollow branch about fifteen feet up a nesting-place of the Red-rumped Parrakeet (*Psephotus haematotus*) containing five young ones in down, and only a few days old, one of which he

extracted from the hollow and held up for me to see. In the same tree he chopped out a nesting-hollow of the Rose-hill Parrakeet (*Platycercus eximius*) about twenty-two feet from the surface of the water, containing two recently hatched young and two chipped eggs. Next he examined in a thick green hollow branch a nesting-place of the Little Lorikeet (*Glossopsittacus pusillus*) which



CUTTING INTO A RED-RUMPED PARRAKEET'S NESTING PLACE

contained three nearly fledged young, one of which he brought down with him for examination. After describing it I threw it into the air, and it flew among some bushes. Mr. Austin secured it again, and threw it with more force into the air, and it flew right away. On the following day I photographed this tree from the opposite side of the river. Not only were three different genera of Parrakeets breeding in the same tree, but Mr. Austin found a new nest of the Yellow-throated Friar-bird (*Philemon citreogularis*), in the tree next to it, and under a ledge of rock in the river bank, about one hundred yards away, a small colony of Fairy Martins (*Petrochelidon ariel*) had constructed their retort-shaped nests, while on a stony bank just above the river bed I discovered three fresh eggs of *Egialitis melanops*.

While resident at Hamilton, Victoria, Dr. W. Macgillivray sent me the following notes:—"Old residents tell me that *Psephotus haematonotus* is not nearly so numerous now as it was twenty to thirty years ago, and this in spite of the fact that its natural enemies, the native cats and hawks are either almost exterminated or much less numerous than they were. This is no doubt due to its natural food, the seeds of herbage and grasses, being very much curtailed by the land being closely cropped by sheep and cattle. This Parrakeet nests during September and October, a hollow spout, fairly high up in a Gum, very often a dead one, being

generally chosen. The eggs, usually six in number, are deposited on a bed of chippings from the trimming of the hollow. The female alone performs the duties of incubation, the male keeping himself in reserve until the young birds demand his attention."

Mr. G. A. Kearthland sent me the following notes from Melbourne:—" *Psephotus haematonotus* during the early spring is usually found in pairs, but when the young are reared they congregate in flocks. They feed exclusively on the ground on grass seed, &c. Whilst the females are sitting on their eggs the males associate in flocks. During a recent visit to Riverina I saw hundreds of males, but could not see a female until I disturbed one from its nesting-place."

Dr. W. A. Angove sent me the following note from Tea-tree Gully, near Adelaide, South Australia:—"Twenty years ago *Psephotus hæmatonotus* was plentiful here, then became almost extinct, but the last few years it has been much more common. It is found on the plains near Adelaide, through the hills and all across the flats to the Murray River, where it is a very common bird and is often associated with *Psephotus multicolor*. *P. hæmatonotus* in full nesting plumage is a very handsome bird on the wing; its nesting time is October and November, and the ordinary clutch is five or six. It nests in the hollows of the Mallee Gums."

From Blackwood, South Australia, Mr. Edwin Ashby writes me:—" *Psephotus hæmatonotus* was exceedingly common in the Adelaide hills in 1886, in fact I saw large flocks within five miles of the city. In or about 1888 this species was attacked by a disease which prevented the new feathers growing again after the moult. I saw numbers running about in the grass like mice, and quite bare of feathers. The result was that for many years these birds were seldom seen for a distance of fifty or sixty miles around Adelaide. I am glad to say that in 1908, twenty years later, although not in a tenth of their numbers, one occasionally saw small flocks in the neighbourhood of the metropolis."

For the purposes of breeding it resorts to a hole in the limb or trunk of a tree, and usually lays six eggs on the decaying wood, found therein, or bitten off by the birds.

The eggs vary from rounded-oval to an ellipse in form, pure white when first laid, but soon becoming stained with the decaying wood, the shell being close-grained, dull and lustreless, some occasionally having a slight gloss. A set of five taken by Mr. E. H. Lane, in October, 1892, on Wambangalang Station, near Dubbo, New South Wales, measures:—Length (A) 0.95 × 0.78 inches; (B) 0.94 × 0.76 inches; (C) 0.9 × 0.77 inches; (D) 0.92 × 0.78 inches; (E) 0.94 × 0.76 inches. A set of five taken on the 12th October, 1901, at St. Arnaud, Victoria, by Mr. Charles J. Gabriel, measures:—Length (A) 0.87 × 0.77 inches; (B) 0.87 × 0.77 inches; (C) 0.87 × 0.78 inches; (D) 0.83 × 0.73 inches; (E) 0.87 × 0.76 inches. A set of seven eggs was taken from the same tree ten days before. A set of six taken on the 2nd October, 1908, by Mr. Thos. P. Austin, on Cobborah Station, Cobbora, New South Wales, measures:—Length (A) 0.9 × 0.75 inches; (B) 0.91 × 0.74 inches; (C) 0.9 × 0.76 inches; (D) 0.89 × 0.75 inches; (E) 0.92 × 0.75 inches; (F) 0.93 × 0.75 inches.

Young males resemble the adult female, but may be distinguished by the yellowish wash to the outer median wing-coverts, the pale bluish forehead, bluish-green cheeks, pale green foreneck, the yellowish patch in the centre of the breast, the dull red tips to the feathers of the rump, and the white spot near the base of the inner webs of the quills, forming a band through the wing when extended. Wing 5.1 inches.

Although nesting operations may begin in New South Wales in August, eggs are not usually laid until September, and are more common in October. On the Namoi River I saw little more than half fledged birds taken from nesting-places on the 9th November, 1896. Recently hatched young birds taken from a hollow limb of a tree on Cobborah Station, on the 14th October, 1909, were covered with greyish-white down; legs and feet dark flesh colour with a greyish wash; bill yellow.

Genus NEOPHEMA, *Salvadori*.**Neophema bourkei.**

BOURKE'S GRASS-PARRAKEET

Nanodes bourkii, Mitchell, Three Expeds. Inter. E. Austr., Vol. I., p. xviii. (1838).*Euphema bourkii*, Gould, Bds. Austr., fol. Vol. V., pl. 43 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 80 (1865).*Neophema bourkei*, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 570 (1891); Sharpe, Handl. Bds., Vol. II., p. 39 (1900); Salvad., Ibis, 1907, p. 314.

ADULT MALE.—*General colour above brown, darker on the centre of the rump and upper tail-coverts; head and hind-neck tinged with salmon-red; primaries, secondaries and primary-coverts brown washed with blue on their outer webs; shoulders and lesser upper wing-coverts blue; remainder of the wing-coverts brown margined with yellowish-white, as are the outer webs of the inner secondaries; six central tail-feathers blackish-brown, shaded with blue on their outer webs; the next on either side blue on the outer webs black on the inner, and largely tipped with white, the white increasing in extent towards the outermost feather on either side, which is wholly white except at the base; feathers at the base of the bill and the orbital region whitish; an indistinct band on the forehead and a narrow superciliary line blue; feathers of the cheeks, throat, chest and breast pale salmon-red, with narrow blackish margins; bases of the feathers brown; abdomen salmon-red; flanks, under tail-coverts, the sides of the rump and outer series of the upper tail-coverts turquoise-blue; bill blackish-horn colour; feet brown. Total length in the flesh 8.5 inches, wing 4.7, tail 4.5, bill 0.5, tarsus 0.5.*

ADULT FEMALE.—*Duller in colour than the male, the cheeks and throat ashy-white margined with brown, and faintly tinged with salmon-red, and with only an indication of the blue frontal band.*

Distribution.—New South Wales, South Australia, Western Australia.

BOURKE'S Grass-Parrakeet was discovered by the late Major T. L. Mitchell, Surveyor-General of New South Wales (subsequently Sir Thomas L. Mitchell) on the Bogan River, and the types were deposited, with many other zoological specimens, in the Australian Museum, Sydney, as recorded in Volume I. of his work* published in 1838. Although Mitchell's name stands as the authority for this species, it was a bare name only, unaccompanied by any description, and consists of "*Nanodes bourkii*, Mitch. (new species) from Bogan River."

Gould first described and figured it in his folio edition of the Birds of Australia, under the name of *Euphema bourkii*,† from examples in the Australian Museum, deposited there by Sir T. L. Mitchell. The upper figure is undoubtedly taken from an immature bird, as is clearly indicated by the white band through the wing. In no specimens, however, have I seen the blue frontal band and superciliary stripe so broad and well defined as there figured. In very old males the feathers of the foreneck and upper breast are salmon-red, like the abdomen, but have pale brownish centres. In one adult male in the Australian Museum Collection, presented by Mr. Percy Peir, the feathers on the rump are entirely turquoise-blue. There is also an abnormally plumaged specimen, with some of the quills, greater wing-coverts, and feathers on the back white.

Bourke's Grass Parrakeet is essentially a bird of the interior. Captain Charles Sturt met with it in numbers at the Depôt, not in Central Australia, as believed by him and consequently many others, but in North-western New South Wales. Mr. Robert Grant obtained a specimen near

* Mitchell, "Three Expeditions into the Interior of Eastern Australia," Vol. I., p. xviii. (1838).

† Bds. Austr., fol. Vol. V., pl. 43 (1848).

Bourke, and from where I have seen living examples in Sydney. The late Mr. K. H. Bennett procured specimens and found its nesting-place and eggs in the Moolah District, and Dr. W. Macgillivray has observed it sixty-miles north of Broken Hill. It has been obtained in different parts of South Australia, and one of a pair of live birds purchased in Adelaide by Mr. W. S. Clark, said to have been obtained one hundred miles north of Port Augusta, lived in confinement for about ten years. M. Octave le Bon informed me he netted eight living examples at a soak near Melville, on the Murchison Gold Field, Western Australia,* and Mr. C. G. Gibson sent me a specimen for identification procured by him at Wiluna, in the East Murchison District.

In 1849 Captain Sturt pointed out the nocturnal habits of this species in his "Expedition to Central Australia," where he writes:—" *Euphema bourkii* was a visitant at the Depôt [North-western New South Wales] and remained throughout the winter, keeping in the day time in the barren brushes behind the camp, and coming only to water. The approach of this little bird was intimated by a sharp cutting noise in passing rapidly through the air, when it was so dark that no object could be seen distinctly, and they frequently struck against the tent cords in consequence."

Mr. Robert Grant, Taxidermist of the Australian Museum, has handed me the following note:—"I have only once met with Bourke's Grass-Parrakeet, and this was in November, 1892, about a mile below the wool wash at Bourke, on the Darling River. A pair were feeding on the ground, and I fired and shot both of them, and secured the male, but the female fell down the steep bank of the river, and I lost it amongst some roots and driftwood left by the floods."

Mr. Percy Peir wrote me from Marrickville, Sydney, under date 5th October, 1909:—"In 1904 I had five pairs of Bourke's Grass Parrakeet (*Neophema bourkei*) sent me from Adelaide, having come from the central district of South Australia. They are very timid and of a gentle nature, the call note and cry of alarm resembling that of the "Budgerigar" or Warbling Grass Parrakeet. They thrive well under ordinary conditions in captivity, canary seed being the main food. Whilst in the aviary they made no attempt at breeding, being at one period molested a good deal by suburban cats. A pair sent to Crystal Palace Exhibition, London, was awarded first prize, similar successes being met with at Sydney shows. Since the above period I have not been successful in securing any more of these Parrakeets, for, like other rarities, they are only to be met with occasionally." Mr. Peir presented a specimen to the Trustees of the Australian Museum, and wrote as follows:—"Enclosed is a specimen of Bourke's Grass Parrakeet. It originally came from South Australia via Adelaide, but I do not know the exact locality. I have had it in captivity about two years. When first received its plumage was mottled with yellow, which subsequently disappeared when it attained adult plumage."

The late Mr. K. H. Bennett wrote:—" *Euphema bourkii* frequents the timbered back country of the south-western portions of New South Wales, and although widely distributed there it is by no means plentiful. It is usually met with in pairs or in small flocks of five or six in number, probably the adults accompanied by their young, and passes most of its time on the ground searching for the seeds of various grasses and herbaceous plants, which constitute its sole food. It resorts to water daily for the purpose of drinking. The breeding season is August to October, and the eggs, four in number, are deposited in the hollow trunk of a small *Eucalyptus* or *Casuarina* (Belar) more frequently the latter."

Dr. W. Macgillivray writes me as follows from Broken Hill, in South-western New South Wales:—" *Neophema bourkei* is nowhere plentiful in the district. It is not found nearer than about sixty miles north from here, on Langawirra Station; its distribution is patchy, and it does not seem to wander far from the localities which favor its habits of living. It usually frequents

* North, Rec. Austr. Mus., Vol. V., p. 268 (1904)

open sandy country, interspersed with small clumps of prickly Acacia, Neelia or other small bushy trees, which usually grow in groups; during the day it lives in these and feeds under the shade of them on various seeds, the small hard black seeds of the Neelia tree being a favourite food. They are rarely seen in flocks of more than six or eight, though I have heard of as many as fifteen being seen. It was, however, a dry time, water was scarce, and they had probably come together on that account. They have the peculiar habit, no doubt a protective one, of coming to water after dark or before dawn, which has earned for them the name of "Night Parrots," by which they are known to all bird trappers and dealers in live birds. The bird trappers tell me that it is often so dark when the birds come to water, usually about 9 o'clock at night, that in pulling their nets they have more often to be guided by the chirruping little note of the birds than by sight. They are quiet unobtrusive little birds in captivity, and are awake long before any of the other birds in my aviary, and may often be seen feeding after all the other birds have gone to roost. However, it is doomed to early extinction. The export and sale of this interesting Parrakeet ought to be prohibited. It is so shy and retiring that one seldom sees it; the bird catchers net it as it comes to water after dark, and usually manage to get all that come. In my aviary I have two pairs of Bourke's Grass Parrakeets, which I procured from a bird-catcher, who found them breeding near the Queensland border in the summer of 1902-3. They have not as yet assumed the adult plumage. I am in hopes they will nest."

Referring to a trip made by Dr. W. Macgillivray, in company with Mr. McLennan, to the north of Broken Hill, in the spring of 1909, the former writes:—"On the 1st October, 1909, Mr. McLennan and I were in one of the Langawirra paddocks watching a White-browed Tree Creeper, when we disturbed a male *Neophema bourkei*, which was feeding on the ground on the seeds of wild Candytuft and other herbs. He resumed his feeding further on, both by himself and then in company with a few "Budgerigars." He then flew to a live Mulga, in front of which stood a dead Neelia, from a hollow in which he was joined by a mate, both flying off together. I went over and found the entrance to the hollow, a crack in a fork four feet from the ground; the hollow was about eight inches in diameter at the bottom, which was covered with earthy wood. In this were four eggs and one recently hatched young bird with the shell still beside it. The nest was not disturbed by us, but, on retiring and watching, the female returned and entered the hollow. On the 5th October, when leaving Langawirra, Mr. McLennan and I saw a pair of these birds on a dead Sandalwood, into a hollow of which, at about ten feet from the ground, the female went; the hollow we found on examination to be empty, but prepared by the birds for nesting purposes. Two young Cockatoo-Parrakeets which we brought back with us were placed in my aviary; an old cock of the same species adopted one, and a female Bourke's Grass-Parrakeet the other, and relieved me of the responsibility of feeding them till they could shift for themselves."

From Wiluna, Western Australia, Mr. C. G. Gibson sent me a specimen for identification, and wrote as follows:—"I am forwarding a skin of a Parrakeet I obtained on the track a few days ago, and would be glad if you would let me know what it is. I have never seen one before. There were about six of them, three appeared similar to the one shot, and three appeared to have little or no white about them. The specimen sent is a male, and I had to shoot it with a bullet, and could only get the one, as the others flew away. They were noticed near Gum Creek, half way between here and Nannine."

Although examples of this species have been taken alive to Europe, it is undoubtedly one of the rarest of our Australian Parrakeets. Its eggs are four in number for a sitting, pure white, oval in form, an average specimen from a set taken by the late Mr. K. H. Bennett, at Moolah, South-Western New South Wales, on the 20th August, 1894, measures 0.9 inches in length by 0.7 inches in breadth.

Neophema venusta.

BLUE-BANDED GRASS-PARRAKEET.

Psittacus venustus, Temm., Trans. Linn. Soc., Vol. XIII., p. 121 (1821).

Euphema chrysostoma, Gould, Bds. Austr., fol. Vol. V., pl. 37 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 71 (1865).

Neophema venusta, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 570 (1891); Sharpe, Handl. Bds., Vol. II., p. 39 (1900)

ADULT MALE.—*General colour above olive-green, the head slightly washed with yellow; inner secondaries like the back; remainder of the quills black washed with blue on the outer webs of the outer secondaries, and paler blue on the apical portion of the outer webs of the outer primaries; upper wing-coverts rich deep blue, some of the inner greater series olive-green about the middle of the feather; central pair of tail-feathers blue, washed with green on their basal half, the next pair blue margined with blackish-brown on their inner webs, the remaining feathers blue at the base, broadly margined with blackish-brown on their inner webs, and largely tipped with yellow, the outermost feather on either side yellow, blue at the base of the outer web, the inner web blackish-brown extending obliquely across the apical portion of the feathers; a band across the forehead and extending above the anterior portion of each eye deep indigo-blue, bordered above with a narrow line of paler blue; lores and a line of feathers above the hinder portion of each eye bright yellow; cheeks, foreneck and upper breast of a more pronounced green; the lower breast, abdomen and under tail-coverts yellow, deeper in colour on the centre of the abdomen, the flanks washed with green. Total length 8.5 inches, wing 4.3, tail 4.6, bill 0.5, tarsus 0.5.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—Victoria, South Australia, Tasmania, and some of the larger Islands of Bass Strait.

IT is somewhat remarkable that of the seven species belonging to the preceding Australian genus, *Psophodes*, not a single representative is found in Tasmania, while of a similar number of species found in Australia, which comprise the genus *Neophema*, two of them also inhabit Tasmania.

The present species, which may be distinguished from all others of the genus by its almost uniform rich deep blue upper wing-coverts, is an inhabitant of the south-eastern portions of the Australian continent, some of the larger islands of Bass Strait and Tasmania. The series of skins in the Australian Museum Collection is a small one, but the skin of an adult male labelled "Adelaide, 1862," and of another labelled "Murray River, 1867," may be easily distinguished from an adult procured by Mr. George Masters, at the Ouse River, Tasmania, in March, 1867, by having the centre of the abdomen rich jonquil-yellow.

I have occasionally observed this species at Keilor and Broadmeadows, Victoria, where it used to breed in hollow stumps, and once, in my early collecting days, I procured a specimen between Government House and the St. Kilda Road, Melbourne. Temminck, in his original description of the Blue-banded Grass-Parrakeet, states that his specimens were obtained at King George's Sound (Western Australia). Mr. George Masters obtained specimens of *Neophema elegans* there, but I have never seen or heard of specimens of *N. venusta* being obtained in that State.

While resident at Circular Head, Tasmania, Dr. L. Holden wrote me:—"About the end of October, 1886, I saw a pair of the Blue-banded Grass-Parrakeets (*Euphema venusta*) about some fallen tree trunks in a potato field at Montagu, and they were possibly breeding, but not knowing their habits of nesting in logs, made no search."

From Melbourne Mr. G. A. Keartland sends me the following notes:—"The Melton District appears to have some special attraction for *Neophema venusta*, as during the months of September and October hundreds of them may be seen feeding in the grass paddocks or perched on the fences. By November they are generally paired, and select the hollow branches of fallen timber for their nesting-places. By January they have disappeared."

From Glenorchy, near Hobart, Tasmania, Mr. Malcolm Harrison writes me:—"The Blue-banded Grass-Parrakeet (*Euphema venusta*) visits us in the spring, arriving generally in September and breeding for the most part in November and in early December. The grassy flats, comparatively sparsely timbered, of the Midland portions of the State, appear to be mostly affected by them, and in no parts have I known them more numerous than in the Greenponds and Bothwell Districts, where food is generally abundant and the timber is not large and contains numerous holes and spouts suitable for nesting purposes. In 1899 I obtained specimens of the eggs from Mr. A. E. Brent, who found this and the Orange-bellied Grass-Parrakeet nesting in numbers on the Woodlands Estate at Melton Mowbray, each species appearing, however, to adhere to its particular locality on the estate in a general way. They are by no means plentiful every year, and for the last two or three seasons there have been very few either at Woodlands or Bothwell, although in 1899 Mr. A. W. Swindells, a resident of the district at that time, found them present in numbers just as Mr. Brent did at Woodlands. In 1907 Mr. A. L. Butler and I hunted the country about Bothwell thoroughly, but saw only three pairs, the nesting holes of two pairs of which we succeeded in locating, taking four and three eggs respectively on the 23rd and 24th November, quite fresh and evidently not complete clutches. Last year I again visited both the formerly favoured localities with Mr. A. E. Brent, but met with no success, scarcely a bird being seen. Messrs. Brent and Swindells took many sets of eggs in the year before mentioned, when they were plentiful, several of which passed through my hands in exchanges, and in nearly every instance the clutch consisted of six, which may, therefore, be accepted as the usual complement. The introduced Starling has taken possession of nearly every available hole and spout in the country formerly found so suitable for breeding purposes, apparently by this Parrakeet, and it appears to me quite possible this may account at least to some extent for the absence of the latter from those particular localities."

The eggs are six in number for a sitting, rounded ovals in form, the shell being close-grained, dull white and lustreless. A set of six in Mr. Malcolm Harrison's collection, taken by Mr. A. W. Swindells at Bothwell, Tasmania, on the 21st November, 1899, measure:—Length (A) 0.87 × 0.77 inches; (B) 0.88 × 0.77 inches; (C) 0.88 × 0.77 inches; (D) 0.88 × 0.77 inches; (E) 0.9 × 0.77 inches; (F) 0.9 × 0.78 inches.

Young birds are much duller in colour than the adults, the inner series of the upper wing-coverts are olive-green like the back; there is only a faint indication of the blue band on the forehead; the lores are dull yellow, and the under tail-coverts yellow washed with green, except on the larger ones. Wing 4.1 inches.

The breeding season usually commences at the latter end of September or early in October, and continues until the middle of January.

Neophema elegans.

ELEGANT GRASS-PARRAKEET.

Nannodes elegans, Gould, Proc. Zool. Soc., 1837, p. 25.

Euphema elegans, Gould, Bds. Austr., fol. Vol. V., pl. 38 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 73 (1865).

Neophema elegans, Salvad., Cat. Bds. Brit. Mus., Vol. XX, p. 572 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 39 (1900).

ADULT MALE.—General colour above olive-green: scapulars, inner series of upper wing-coverts and the outer webs of the inner secondaries like the back, the outer upper wing-coverts dark blue, separated by a band of rich light blue extending down the middle; remainder of the quills black, dark blue on their outer webs, the apical portion of the outer primaries washed with pale greenish blue: central pair of tail-feathers blue, washed with green at their base, and which extends along their margins for two-thirds of their length: the remainder blue on the outer webs, blackish-brown on the inner and tipped with yellow, these tips increasing in extent towards the outermost feather on either side, which is entirely yellow, except at the extreme base: a band across the forehead of deep indigo-blue, bordered above with a narrower line of light blue, which extends over the eye: lores yellow: throat, fore neck, chest, and flanks olive-green shaded with yellow: lower breast and abdomen greenish-yellow, with an orange spot in the centre of the abdomen: under tail-coverts bright yellow: under wing-coverts and upper edge of the wing deep blue. Total length 8.75 inches, wing 4.4, tail 5, bill 0.55, tarsus 0.5.

ADULT FEMALE.—Resembles the adult male, but is slightly duller in colour, the indigo band on the forehead narrower, there is less rich light blue down the middle of the upper wing-coverts, no orange spot in the centre of the abdomen, and the yellow under tail-coverts are slightly washed with green.

Distribution.—South-western Queensland, New South Wales, Victoria, South Australia, Western Australia, North-western Australia.

IT was fortunate that the Trustees of the Australian Museum had for a long period from 1865 the services of Mr. George Masters as collector. All the zoological departments have benefitted by his exertions in Queensland, New South Wales, South Australia, Western Australia and Tasmania, and none more so than the bird collections. Had his visits to the other States been delayed for a decade or two, the opportunities for procuring specimens would have been far less favourable, if not in some instances entirely lost. In November, 1865, he procured specimens of *Neophema elegans* at Port Lincoln, South Australia, and in October, 1868, at King George's Sound, and January, 1869, at Mongup, Salt River, Western Australia, a fine series of both sexes and also young. A golden-yellow wash pervades some adult specimens, and is most marked in the upper tail-coverts of an adult male procured by Mr. Masters at King George's Sound in October, 1868.

Of its distribution Mr. Tom Carter records it as fairly common at Broome Hill, Western Australia, and informs me that one was picked up dead at Point Cloates, North-western Australia. Dr. A. M. Morgan found it breeding at Yultacowie Creek, one hundred and twenty miles north-west of Port Augusta, South Australia, and Mr. Edwin Ashby records it from Murray Bridge in that State, and from Ascot, near Ballarat, Victoria. Dr. W. Macgillivray has noted it as rare in the Broken Hill District of South-western New South Wales, and the late Mr. K. H. Bennett has observed it in the Mossgiel District. I have never seen or heard of it being obtained in Eastern and Northern New South Wales, but the late Mr. K. Broadbent has recorded it as occurring at Chinchilla, in Southern Queensland.

The late Mr. K. H. Bennett wrote me from the Mossgiel District, New South Wales:—“*Euphema elegans* I have met with only on the borders of the large cane-swamps, in the open plains far from timber, and either in pairs or small flocks of five or six in number. It is an extremely shy species, and when flushed flies with a peculiar zig-zag flight, sometimes pitching to the ground within a short distance, but more frequently ascending to a great altitude and flying off until lost to sight. I have never known of an instance of it breeding here.”

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray writes me:—“I have seen a few examples of *Neophema elegans* caught in the district, but they are rare.”

Mr. Edwin Ashby wrote me as follows from Blackwood, South Australia:—“*Neophema elegans* is not uncommon at Murray Bridge, South Australia. In May, 1886, I also found it very freely dispersed at Ascot, near Ballarat, Victoria. As far as I could ascertain thistle seed there formed the attraction.”

From Adelaide, South Australia, Dr. A. M. Morgan wrote me:—"I have met with *Neophema elegans* from the Finnis River in the south to Yultacowie in the north, and also about thirty miles west of Port Augusta. In the latter situation they appeared to be migrating westward. I found them breeding in a Gum creek at Yultacowie on the 11th August, 1900; the two clutches which I took each consisted of five eggs, which had begun to incubate. With one set an egg of *Egotheles novæ-hollandiæ* was found; it was sterile, as also were those of the *Euphema*. The latter nest was about twenty feet from the ground, and the eggs two feet from the entrance. The young male and female birds I shot at the Finnis River on the 27th November, 1896, had the fourth, fifth, sixth, seventh and eighth primaries largely spotted with white, and there was barely a suggestion of the orange colour on the abdomen."

Mr. Tom Carter writes me from Broome Hill, South-western Australia:—"Only one specimen of *Neophema elegans* was obtained at Point Cloates, which was picked up dead on the 31st March, 1900, and was in immature plumage. They are fairly common in the vicinity of Broome Hill."

The eggs are five in number for a sitting, almost globular in form, white, except where stained with the decaying wood, the shell being close-grained, dull and lustreless. A set of four in Mr. Chas. French, Junr.'s, collection, taken by Mr. W. White in South Australia, in August, 1895, measures:—Length (A) 0·8 × 0·72 inches; (B) 0·82 × 0·68 inches; (C) 0·78 × 0·67 inches; (D) 0·78 × 0·67 inches. A set taken by Dr. A. M. Morgan, at Yultacowie Creek, one hundred and twenty miles from Port Augusta, South Australia, and which also contained an egg of *Egotheles novæ-hollandiæ*, measure as follows:—Length (A) 0·83 × 0·71 inches; (B) 0·83 × 0·71 inches; (C) 0·83 × 0·71 inches (D) 0·82 × 0·72 inches; (E) 0·87 × 0·72 inches.

Young birds are like the adult female, but are slightly greener on the head and under parts, and with only a faint indication of the indigo band on the forehead, and the lores but slightly tinged with yellow. Wing 4·2 inches.

In South Australia Dr. A. M. Morgan took incubated eggs on the 11th August. In Western Australia Gould records that Gilbert informed him "the breeding season is in September and October; the eggs being from four to seven in number."

Neophema chrysogastra.

ORANGE-BELLIED GRASS-PARRAKEET.

Psittacus chrysogaster, Lath., Ind. Orn., Vol. I, p. 97 (1790).

Euphema aurantia, Gould, Bds. Austr., fol. Vol. V., pl. 39 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 75 (1865).

Neophema chrysogastra, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 573 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 39 (1900).

ADULT MALE.—*General colour above, including the upper part of the head and sides of the neck grass-green; most of the upper wing-coverts, as well as the inner secondaries like the back: remainder of the quills black on their inner webs, dark blue on their outer webs, the outer primaries externally edged with yellow: the outer median and greater wing-coverts and primary-coverts deep blue: central pair of tail-feathers green, bluish towards the tips, the next on either side greenish-blue on the outer web, blackish-brown on the inner and tipped with yellow, the remainder similar but more largely tipped with yellow, which increases in extent towards the outermost feather on either side: across the forehead a blue band margined with a narrower line of pale greenish-blue; lores yellowish-green; throat, chest and flanks grass-green, passing into greenish-yellow on the abdomen, which has a rich*

orange patch in the centre; under tail-coverts yellow; under wing-coverts and edge of the wing deep blue; upper mandible blackish, the lower one flesh colour, greyish in the centre; legs and feet reddish flesh colour; iris light hazel. Total length 8.5 inches, wing 4.26, tail 4.1, bill 0.52, tarsus 0.52.

ADULT FEMALE.—Similar to but slightly duller in plumage than the male.

Distribution.—New South Wales, Victoria, South Australia, Tasmania.

ALTHOUGH the Orange-bellied Grass-Parakeet is fairly plentiful in Tasmania during some seasons, and which may be regarded as the stronghold of the species, it is exceedingly rare in New South Wales, the northern limit of its range. The late Mr. J. A. Thorpe obtained a male and female at Middle Head, Sydney Harbour, where he found them breeding in a low hollow stump, also a specimen at Long Bay, and where in the latter locality Mr. George Masters, Curator of the Macleay Museum, at the University of Sydney, also procured an adult male and female. These are the only specimens I know to have been procured in New South Wales, and it is remarkable that all the birds were shot within a few miles of Sydney. It is certainly nomadic in habits, for in South Australia, as will be seen by Mr. Edwin Ashby's note, an irruption of these birds occurred near Adelaide in November, 1886, and he has not observed it since. Gould, in referring to this species, remarks:—"I observed it sparingly dispersed in the neighbourhood of Hobart Town and New Norfolk, but found it in far greater abundance on the Actæon Islands, at the entrance to D'Entrecasteaux Channel. . . . On visiting South Australia in winter, I then found it equally abundant on the flat, marshy grounds bordering the coast, especially between the Port of Adelaide and Holdfast Bay." As will be seen, too, by Mr. Malcolm Harrison's notes made in Tasmania, it is very abundant in some seasons, and is then again almost entirely absent for years. In the "Catalogue of Birds in the British Museum,"† Count Salvadori enumerates a specimen in the Gould Collection from Melbourne.

In March, 1911, Mr. W. J. Banks brought me for examination a living bird of this species he had in confinement for the preceding four years. It was remarkably quiet, while we were handling it, submitting to my taking the measurements and colours of it, and my extending the wings without uttering a sound or attempting to bite or struggle. It was without exception the quietest bird I had ever handled.

Mr. Percy Peir writes me under date 5th October, 1909, from Marrickville, Sydney:—"Some twenty odd years ago the Orange-bellied Grass-Parakeets (*Neophema chrysogastra*) were numerous about Penshurst and Blacktown, where they afforded some shooting for the sportsmen of the day. They were often to be found in the possession of bird-keepers, but are practically unknown now. During 1907 a beautiful specimen appeared at a Sydney Show, and I was informed by the owner that it was captured at Riverstone, and shortly after this I received a female from the same locality. It is very similar in nature to the Bourke Grass-Parakeet, being very timid and nervous in any one's presence, and on the introduction of the hand into the cage it would lie flat on the floor and endeavour to hide its head. Unfortunately it escaped from captivity."

From Blackwood, South Australia, Mr. Edwin Ashby sends me the following note:—"Neophema chrysogastra was very numerous in the native Pine trees at the Grange, near Port Adelaide, in November, 1886. The boys from the Port were shooting them with every sort of firearm. I only collected two specimens, and have never seen the bird alive since."

Dr. L. Holden sent the following notes from Circular Head, on the north-west coast of Tasmania, when presenting a skin of this species to the Trustees of the Australian Museum:—"On the 24th May, 1887, I fired into a flock of Orange-bellied Grass-Parakeets (*Euphema chrysogastra*) at Long Beach, Circular Head, killing three birds. None of them had the orange spot on the centre of the abdomen so well developed as a specimen procured on Circular Head

* Handbk. Bds. Austr., Vol. II., p. 75 (1865).

† Cat. Bds. Brit. Mus., Vol. XX., p. 574 (1891).

Peninsula, in May, 1886. In one of the specimens the upper aspect of the tail-feathers is much bluer than in the other two. On the 9th September, 1887, I saw one on a rough, stony, uncultivated patch on top of Green Hills, Circular Head, and in June, 1888, I saw a flock about the same place."

From Glenorchy, near Hobart, Tasmania, Mr. Malcolm Harrison writes me:—"The Orange-bellied Grass-Parrakeet arrives about the same time as the Blue-banded Grass-Parrakeet, but in my experience not in the same numbers, and the same class of country is apparently congenial to both, although each species seems to prefer its own particular area in which to carry on nesting operations. Messrs. A. C. Butler, A. W. Swindells and I noticed this in the Bothwell District, and Mr. Brent found the same thing occurring at Melton in 1899, when both species were so plentiful. For several years past very few of these birds have visited their usual haunts, nor can I hear of them as frequenting other parts. Mr. Brent and I, during the latter part of 1908, devoted a week entirely in pursuit of the Parrakeets (*Euphema venusta* and *E. chrysogastra*) and succeeded in finding one solitary bird of the latter species in a tree on the Dennistown Estate at Bothwell. I have had several sets of the eggs, in each case consisting of four, and I am inclined to think that number, and occasionally five is the complement."

It usually breeds in a hole in a tree limb, and sometimes in a stump or log lying on the ground. The eggs are four or five in number for a sitting, almost globular in form, pure white, except where nest-stained, the shell being close-grained, smooth and lustreless. A set of four in Mr. Malcolm Harrison's collection, taken at Bothwell, Tasmania, by Mr. A. W. Swindells, on the 6th November, 1898, measures:—Length (A) 0.88 × 0.67 inches; (B) 0.82 × 0.7 inches; (C) 0.83 × 0.68 inches; (D) 0.81 × 0.68 inches. Another set of four in the same collection, taken by Mr. A. E. Brent, at Woodlands, Melton Mowbray, Tasmania, on the 15th December, 1899, measures:—Length (A) 0.88 × 0.73 inches; (B) 0.9 × 0.73 inches; (C) 0.9 × 0.75 inches; (D) 0.88 × 0.76 inches.

Like *Neophema venusta* it is a late breeder, November and the two following months constituting the usual breeding season.

Neophema petrophila.

ROCK-PARRAKEET.

Euphema petrophila, Gould, Proc. Zool. Soc., 1840, p. 148; *id.*, Bds. Austr., fol. Vol. V., pl. 40 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 76 (1865).

Neophema petrophila, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 574 (1891); Sharpe, Handl. Bds., Vol. II., p. 39 (1900).

ADULT MALE.—General colour above dull olive-green, upper wing-coverts and inner secondaries like the back, the extreme outer wing-coverts blue, the greater series with dull olive-green tips, the outer webs of the outer secondaries olive-green, bluish at the base; inner webs of quills brownish-black, the primary coverts and outer webs of primaries dark blue, the latter margined with greenish-blue, which decreases in extent towards the inner primaries, all but the outer webs very narrowly edged with pale brown around their tips: central pair of tail-feathers green, slightly washed externally with olive, and shaded with blue near their shafts, the remainder greyish-blue washed with green on their outer webs their inner webs brownish-black and tipped with yellow, these yellow tips increasing in extent towards the outermost feather on either side, which is entirely yellow, except at the base: band on the forehead deep rich blue, bordered before and behind with redder-blue, which extends in a narrow ring around the eye, the lores a slightly deeper blue; throat and upper breast and flanks olive-green, shaded with

yellow, becoming brighter on the lower parts of the body; remainder of under surface and under tail-coverts yellow; bill dark bluish-horn colour; legs and feet greyish-brown; iris dark brown. Total length in the flesh 8.5 inches, wing 4.3, tail 1.5, bill 0.5, tarsus 0.55.

ADULT FEMALE.—Slightly duller in plumage than the male, and without the orange spot on the abdomen.

Distribution.—South Australia, Western Australia.

THE Rock Parakeet is one of the most uniformly coloured species of the genus. Gilbert found it breeding "in the holes of the most precipitous cliffs" on Rottneest and other islands near Swan River, in Western Australia, and Count Salvadori, in the "Catalogue of Birds in the British Museum," enumerates specimens collected as far north as Freycinet's Harbour, Shark Bay, Western Australia, during the Voyage of H.M.S. "Herald." In the collection of the Australian Museum are specimens procured by Mr. George Masters, at Port Lincoln, South Australia, in September, 1865, and an adult male and female received in exchange from the Trustees of the South Australian Museum, Adelaide, procured by the then Assistant Director, Mr. A. Zietz, on Mare Island, one of the Sir Joseph Bank's Group in Spencer's Gulf, in September, 1890. Mr. Zietz was also successful in obtaining during the trip other specimens, on Spilsby Island, in the same group, where he found this species breeding in holes and cavities under the rocks. There is also an adult male and female in the collection received from the Trustees of the Western Australian Museum, Perth, procured by Mr. C. P. Conigrave on the 12th August, 1905, at Rottneest Island. Mr. Bernard Woodward, the Curator, has also sent on loan for examination a fine series of sixteen adult skins of both sexes, obtained from different localities in Western Australia, but chiefly from Rottneest Island. They were mostly collected by Mr. J. T. Tunney, the Museum collector, who has appended brief notes on some of the labels. A male and female from Moudrain Island, obtained on the 30th April, 1906, bear a note—"Not numerous, only saw four since I have been on island;" of two females procured at Esperance Bay in April, 1906, "not numerous, shot on the sea-shore;" and of a male shot on Sandy Hook Island on the 16th November, 1904, "scarce in this part, have only seen two;" and another procured at Point Malcolm on the 17th June, 1906, "mostly seen along the sea-shore."

In a series of twenty adult specimens now before me only one, a male procured by Mr. A. Zietz, on an island off the South Australian coast, has an indication of an orange spot on the centre of the abdomen.

From the Reed-beds, near Adelaide, Mr. W. White wrote me as follows under date 7th May, 1893:—"Although I have never taken the eggs of *Euphonia petrophila* on Kangaroo Island, I have seen these birds going into holes in the inaccessible cliffs of the Althorpe Islands, lying off Cape Spencer, in Investigator Strait. I am going to Kangaroo Island next August, and will keep a look out for this species."

Mr. A. Zietz wrote me:—"I have observed *Euphonia petrophila* at Aldinga Bay on top of the rocks near the sea-shore, and I am also informed it frequently occurs on Yorke's Peninsula. I saw six of these birds alive, in a bird-dealer's shop in Adelaide. As you know, I have obtained both birds and eggs on the islands of the Sir Joseph Bank's Group."

Mr. Tom Carter writes me from Broome Hill, South-western Australia:—"Neophema *petrophila* is common about Albany, not only where the coast is rocky, but they were also frequently observed feeding about salt marshes, and also in scrub some little distance from the beach. When staying at the Margaret River, in 1903, I was informed they used to be common along the bold coast line there, and bred underneath the large slabs of rock piled up above high-water mark, but they never came under my notice."

* Cat. Bds. Brit. Mus., Vol. XX., p. 575 (1891)

The eggs are four or five in number for a sitting, rounded oval in form, white, except where earth-stained, the shell being close-grained, dull and almost lustreless. An average egg taken by Mr. A. Zeitz on Spilsby Island, Sir Joseph Bank's Group, measures:—Length, 0.94×0.78 inches. Two eggs of a set of four taken in Western Australia measure:—Length (A) 0.98×0.78 inches: (B) 0.97×0.79 inches.

September and the three following months constitute the breeding season.

Neophema pulchella.

CHESTNUT-SHOULDERED GRASS-PARRAKEET.

Psittacus pulchellus, Shaw, Nat. Miscel., pl. 96 (1792).

Euphema pulchella, Gould, Bds. Austr., fol. Vol. V., pl. 41 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 77 (1865).

Neophema pulchella, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 575 (1891); Sharpe, Handl. Bds., Vol. II., p. 39 (1900).

ADULT MALE.—*General colour above green: upper wing-coverts bright blue, the inner series chestnut-red, inner webs of quills black, their outer webs as well as the primary-coverts dark blue, the outer primaries very narrowly edged with light greenish-blue, the outer webs of the inner secondaries green: central pair of tail-feathers green, the next on either side green on the outer web, black on the inner web and tipped with yellow, the remainder similar, but more largely tipped with yellow, which increases in extent towards the outermost feather on either side, which is entirely yellow, except at the base: occiput, ear-coverts, sides of neck and hind-neck green, slightly shaded with yellow: lores, cheeks and a stripe of feathers over the eye reddish-blue: a broad band across the forehead deep blue; throat, all the under surface and under tail-coverts rich yellow, the sides of the chest washed with green: under wing-coverts rich bright blue. Total length 8.4 inches, wing 4.3, tail 4.3, bill 0.5, tarsus 0.5.*

ADULT FEMALE.—*Duller in colour than the male, the chest washed with green, a far less amount of blue on the face, lores dull yellow and without the chestnut-red streak on the inner wing-coverts.*

Distribution.—New South Wales, Victoria.

IN former years the Chestnut-shouldered Grass-Parrakeet was very common in the neighbourhood of Sydney, but the last specimen received by the Trustees of the Australian Museum was that of a young bird, procured by the late Mr. J. A. Thorpe at Hornsby, in June, 1886. There are adults and young of both sexes in the collection, obtained principally at North Sydney, and between Parramatta and Penrith, at Rope's Creek, Eastern Creek and Bankstown. In the latter localities Mr. George Masters, Curator of the Macleay Museum, at the University of Sydney, who obtained many of these specimens, informs me they were very numerous in 1875. Dr. E. P. Ramsay also obtained specimens at Dobroyde, Ashfield, in 1865, and the late Mr. Percy Ramsay found it breeding at Macquarie Fields in August, 1859. It is a matter for regret that this Grass-Parrakeet has for many years past entirely disappeared from the neighbourhood of Sydney, for it is one of the most beautiful species of the genus *Neophema*, nor can I gain information of it occurring elsewhere in any numbers in other parts of the State. Aviculturists have several times applied to me as to its whereabouts, for they were anxious to obtain examples for their aviaries.

Individual variation is not uncommon in this species. In the Australian Museum Collection it is most marked in a mounted adult male, obtained at Rope's Creek, which has the under surface, but more particularly the fore-neck, upper breast and thighs washed with orange-red. Others have indications, more or less, of a reddish-orange spot, but this is most pronounced in an adult female obtained at North Shore, Sydney, in September, 1876. An adult male procured at

Sydney in October, 1876, has a broken yellow cross-band on the centre of some of the blue median upper wing-coverts.

Mr. E. H. Lane, of Orange, writes me as follows:—"At Wambangalang, near Dubbo, New South Wales, early in October, 1882, I found a nesting-place of *Euphema pulchella* in a White Box tree, and took a set of four eggs. This is the only nest I have found of this species, and have observed it only on this occasion at Wambangalang. Probably its appearance there was due to dry weather, for in the same month and year I obtained a set of the eggs of *Psophodes multicolor*, the first and only time I have observed this species in that locality."

Mr. Robert Grant, Taxidermist of the Australian Museum, has given me the following notes:—"The Chestnut-shouldered Grass-Parrakeet I almost invariably met with in pairs, on different parts of the Blue Mountains, New South Wales, and have shot them on the road between Wallerawang and Wolgan, also at Sodwalls on the western line. The only place I ever found a small community together was on the margins of a swamp, on the late Mr. Mumford's estate, on the top of the Zig-zag near Mount Edgecumbe. They were feeding on the pine-like seed-cones of a small shrub that grew plentifully on the higher ground, and I found about six or seven pairs nesting in the hollow branches of the Gum-trees around the swamp. This was in December, 1885, and a young bird obtained was subsequently sent to the Australian Museum. The female has less blue on the face, and usually has not the red shoulder spot, but in some specimens, probably very old birds, I have seen traces of it on lifting up the scapulars. It is many years ago since I saw an example of this species."

The nesting-place is usually in a hole in a branch of a tree, or in a log or fallen tree, usually a Eucalyptus and less frequently a *Casuarina*, the eggs being deposited on the decaying wood or dust, usually found in these cavities.

The eggs are four in number for a sitting, varying from almost globular to rounded-oval and ellipses in form, pure white, except where nest-stained, the shell being close-grained, smooth and lustreless. A set of four taken by the late Mr. Percy Ramsay, at Macquarie Fields, New South Wales, in August, 1859, measures:—Length (A) 0·8 × 0·7 inches; (B) 0·8 × 0·7 inches; (C) 0·85 × 0·7 inches; (D) 0·88 × 0·72 inches. A set of four in Mr. E. H. Lane's collection, taken at Wambangalang Station, near Dubbo, New South Wales, early in October, 1882, measures:—Length (A) 0·88 × 0·7 inches; (B) 0·88 × 0·7 inches; (C) 0·89 × 0·71 inches; (D) 0·87 × 0·7 inches. The eggs of this set are slightly lustrous.

Young birds resemble the adult female, but are duller in colour, having more green and less yellow on the under parts; lores and a narrow frontal band dull yellowish-white, above which the feathers are washed with blue, as are also those on the fore part of the cheeks. Wing 4 inches. At this early stage of their existence young males may be distinguished by having a dull red spot at the tip of one or more of the green inner upper wing-coverts.

The usual breeding season in New South Wales commences in August, and continues during the four following months.

Neophema splendida.

SCARLET-CHESTED GRASS-PARRAKEET.

Euphema splendida, Gould, Proc. Zool. Soc., 1840, p. 147; *id.*, Bds. Austr., fol. Vol. V., pl. 42 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 79 (1865).

Neophema splendida, Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 576 (1891); North, Ibis, 1894, p. 260; Sharpe, Hand-l. Bds., Vol. II., p. 39 (1900).

ADULT MALE.—*General colour above, including the outer webs and tips of the inner secondaries green: occiput and nape green, washed with blue at the tips of most of the feathers: upper wing-*

coverts pale blue, slightly deeper in colour on the shoulder, inner webs of the quills black, their outer webs dark blue, the apical portion of the outer primaries narrowly edged with light green, the outer webs of the outer secondaries washed with green; central pair of tail-feathers green with a slight bluish shade near their base, the next on either side green on the outer web, black on the inner, the remainder similar but tipped with bright yellow, these yellow tips increasing in size towards the outermost feather on either side, which is entirely yellow, except at the base; forehead and cheeks deep blue, becoming paler on the sides of the head, ear-coverts and sides of upper neck; chest and upper breast scarlet; sides of the lower neck, chest and breast green; remainder of under surface and under tail-coverts rich yellow; under wing-coverts deep blue. Total length 8 inches, wing 4.4, tail 4.2, bill 0.5, tarsus 0.5.

ADULT FEMALE.—Duller in plumage than the male, with a less extent of blue on the face, and the centre of the chest and upper breast not scarlet, but uniform green like the sides.

Distribution.—Western Australia, South Australia, New South Wales.

GOULD described the present species in the "Proceedings of the Zoological Society of London," in 1840,* the type of which was obtained in Western Australia, and later on wrote in his folio edition of the "Birds of Australia" †:—"It is a source of much regret to me that I am unable to give more than a very slight notice of the beautiful bird that forms the subject of the present Plate. The single specimen from which my description was taken came into my possession in 1840, unfortunately without any other information accompanying it than that it was a native of Swan River; from that period no other example occurred until 1845, when several fine specimens were transmitted to me by the late Mr. Johnson Drummond, who had killed them near Moore's River, in Western Australia, and from whom I should doubtless have received some particulars respecting the habits of this lovely species had he not been treacherously murdered by a native in his company, while engaged in seeking for materials for this and my other works on the Fauna of Australia." As in Gould's time, so it is now, undoubtedly the rarest species of the genus *Neophema*. The Splendid, or Scarlet-chested Grass-Parrakeet, is very sparingly distributed in Western New South Wales, the inland districts of South Australia, and according to Gould the South-western portion of Western Australia. The specimens in the Australian Museum Collection are from the Darling River, New South Wales, the Gawler Ranges and other parts of South Australia.

In reply to an inquiry, Mr. Bernard H. Woodward, Director of the Western Australian Museum, Perth, writing in September, 1909, remarks:—"I regret to state that as yet I have been unable to obtain specimens of *Neophema splendida*. I have never heard of its having been found in the neighbourhood of Perth, although in the works on the Ornithology of Australia it is said to occur in our South-western District. It must be very rare, as neither our Collector nor any of our contributors have been able to get specimens."

Mr. Chas. G. Gibson, late Assistant Government Geologist of Western Australia, who has travelled largely over that State in the prosecution of his official duties, writes:—"As to *Neophema splendida*, I have never seen it, so you can safely say it is not found in the Central and Western portions of the State; unfortunately I do not know much about the birds in the coastal districts."

Mr. Tom Carter writes from Broome Hill, South-western Australia:—"I have never seen *Neophema splendida* in any part of Western Australia."

Mr. Robert Grant, Taxidermist of the Australian Museum, has given me the following note:—"In November, 1892, I flushed a beautiful male *Neophema splendida* out of some *Polygonum*, near Bourke, on the Darling River, Western New South Wales, and it flew into a low tree. This bird I shot, and afterwards carefully searched all around for the female, but did not find it. This is the only instance I have ever seen this species alive in the bush."

* Proc. Zool. Soc., 1840, p. 147.

† Bds. Austr., fol. Vol. V., text opp. pl. 42 (1848).

"A nesting-place of this Parrakeet, containing four eggs, was found by Mr. W. White near Pudnooka, in the Murray Scrub, the eggs being simply deposited on the decaying wood in the hollow limb of a *Eucalyptus dumosa*. The eggs are white, and nearly round in form, the texture of the shell being very fine and nearly lustreless. An average specimen measures 0·88 × 0·77 inches. This is the only occasion on which I have known the eggs of this species to have been taken. Mr. White captured the female while sitting, and succeeded in keeping her in an aviary for several years." Upon forwarding Mr. White, of the Reedbeds, Adelaide, a reprint of "The Ibis" for 1894, in which the above information appeared, also on the eggs of *Polytelis melanura* and *Glossopsittacus porphyrocephalus*, obtained by Mr. White, he wrote me as follows:—"Your little pamphlet *re* Parrakeets to hand, for which I thank you. I read it with much interest, as it brought to mind places, and past people and scenes, and little difficulties and disappointments surrounding those few words written on *Euphema splendida*. I was surprised to read that it was the first time you had known the eggs of this species to have been taken. It was in September, 1853, when in company with Mr. J. Taylor, the owner of Pudnooka Station. It brought clearly to my mind the place, the tree and the circumstances under which that solitary bird was taken, and our endeavours to get the male bird by watching, but without success. From the very limited opportunity I ever had of observing this species, it appears to me that it is an extremely solitary, and almost noiseless resident of the most lonely scrub, and only sufficiently sociable to go in pairs at certain seasons of the year. I got a fine male bird, a solitary object, far in the scrub, where there was no other life to be seen, except the *Cicada*, and no water for many miles. At other times I have come across an almost noiseless bird, as it darts out of a clump of Mallee, to be seen or heard no more, for it is a hundred to one chance if you see it again. The note is very feeble, a faint running sound, and one has to be fairly smart to hear it. The female I caught on the nest and kept in the aviary most certainly bore out the views I formed. She selected the most out of the way dark corner for her abode, and there she remained from week to week and month to month, for several years, always to be seen in or about the same spot. In the spring, when all the other Parrakeets, *Euphema elegans* included, were active and noisy, there sat that solitary object in its usual spot."

Genus NANODES, Vigors and Horsfield.

Nanodes discolor.

SWIFT-FLYING PARRAKEET.

Psittacus discolor, Shaw in White's Voy., p. 263, pl. 49 (1790).

Lathamus discolor, Gould, Bds. Austr., fol. Vol. V., pl. 47 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 90 (1865).

Nanodes discolor, Salvad., Cat. Bds. Brit. Mus., Vol. XX, p. 592 (1891); *id.*, Ibis, 1907, p. 317.

ADULT MALE.—*General colour above green; lores yellow; forehead crimson; throat crimson bordered with yellow; snicuput deep blue; primaries blackish-brown washed with deep blue on the basal portion of their outer webs, the outermost series externally edged with yellow, and the innermost series with green, narrowly margined with yellow; secondaries blackish-brown, green on their outer webs, and crimson on the inner webs of the innermost series, all the inner webs of the quills margined with straw-yellow; primary coverts and bastard-wing dark blue; outer series of the greater wing-coverts blue; shoulder dark red; remainder of the upper wing-coverts and scapulars green; two central tail-feathers dull red, blue at the tips, remainder of the tail-feathers blue, yellowish-green at the tips, washed with dull red, decreasing in extent towards the outermost feather on either side; chest, breast*

* North, Ibis, 1894, p. 260.

and all the under surface yellowish-green, slightly darker on the sides of the breast; flanks more strongly washed with yellow and occasionally spotted with crimson: under tail-coverts dull crimson, narrowly edged and tipped with yellow, some of the larger ones centred with green at the tips; axillaries and under wing-coverts bright crimson, outer series of the lesser under wing-coverts yellowish-green; edge of the wing blue; bill fleshy-brown colour; feet whitish-brown; iris yellowish-orange. Total length in the flesh 9.3 inches, wing 4.8, tail 5.7, bill 0.58, tarsus 0.7.

ADULT FEMALE.—Resembles the adult male in plumage, but is much duller in colour.

Distribution.—Southern Queensland, New South Wales, Victoria, South-eastern South Australia, Tasmania.

MESSRS. Vigors and Horsfield founded the genus *Nanodes*, and in the "Transactions of the Linnean Society of London" remark:—"The present Australian group of Ground Parrakeets, include *Nanodes*, *Platyercus* and *Pezoporus*." In the "Catalogue of Birds in the British Museum," Count Salvadori places *Nanodes* in the Sub-family PLATYERCINÆ, and of the Australian genera, between *Neophema* and *Melopsittacus*, which is followed by *Pezoporus* and *Geopsittacus*. The two latter are essentially terrestrial genera, and *Platyercus*, *Neophema* and *Melopsittacus* are both terrestrial and arboreal. In habits and actions there is nothing to distinguish *Nanodes discolor* from the different members of the genera *Trichoglossus* and *Glossopsittacus*, and it is strictly an arboreal species, obtaining its normal food, the nectar of flowers, from the blossom of the *Eucalypti* in a similar manner to other Australian species of the family TRICHOGLOSSIDÆ. The range of the Swift-flying Parrakeet extends throughout Southern Queensland, New South Wales and Victoria, with the adjoining portions of South Australia; it also inhabits Tasmania. In the Australian Museum Collection there are specimens obtained by the late Mr. George Barnard on the Dawson River, Queensland, by Dr. E. P. Ramsay at Ashfield, near Sydney, in June 1865, and by Mr. George Masters and Mr. K. Broadbent in different parts of Tasmania.

There is the usual variation in the plumage, as in other species of Parrakeets. One adult male now before me has some of the green feathers of the breast tipped, and others narrowly edged with crimson. Another has the entire plumage of the under surface, except the crimson throat, strongly suffused with yellow.

In Victoria, in my early collecting days, the Swift-flying Parrakeet was one of the commonest species to be found almost anywhere in the vicinity of Melbourne when the various species of *Eucalypti* were in blossom, and among other localities that might be particularly mentioned are Albert Park, St. Kilda, Toorak, and Oakleigh. I also found it abundant at Western Port, and observed it on Mount Wellington, near Hobart, Tasmania. In New South Wales Dr. Ramsay used to obtain specimens at Ashfield in 1865-8, but I have never observed it during a long residence in the same locality, or in any other of the suburbs of Sydney. In June, 1910, however, specimens were received in the flesh by the Trustees of the Australian Museum, procured by Mr. A. M. N. Rose at Campbelltown, twenty miles from the metropolis.

Dr. L. Holden, while resident in Tasmania, wrote me as follows:—"Mr. E. D. Atkinson picked up a specimen of *Lathamus discolor* at Boat Harbour, having killed itself by flying against a telegraph wire. At Bellerive, near Hobart, on the 5th September, 1897, I saw several of these birds flying about from tree to tree, feeding on the blossom of some Blue Gums on the opposite side of the road, and knocked one down with a stone. These Parrakeets were about Bellerive all the spring of 1897. In the spring of 1898, on the banks of the Derwent River, just above New Norfolk, a boy was shooting Parrakeets out of the Gum trees on his father's farm, to lessen the damage they did to the fruit crops. I examined the string of birds he had,

* Trans. Linn. Soc., Vol. XV, pp 274-5 (1826).

and with one exception they were all Swift-flying Parrakeets. It is remarkable how a bird of such varied and bright markings appears in a tree to be purely green, although if you happen to be beneath one during flight, the scarlet under wing-coverts are very conspicuous."

Mr. G. A. Kearthland, of Melbourne, writes me as follows:—" *Nanodes discolor* is rightly named the 'Swift Parrakeet:' the first intimation of the presence of these birds is usually to hear their short notes as a flock dashes past in the forest. Whenever they find a Yellow Box tree in blossom they stop for a feed, but are seldom found in the same neighbourhood beyond a day or two. In 1902 I shot a young one at Eltham, and although but a few days from the nest it was marked similarly to the adults."

For the purposes of breeding a hole in the branch of a tree, or a hollow spout is selected, usually of a *Eucalyptus*, and the eggs, two in number, are laid on the decaying wood or wood dust, usually found in these cavities. The eggs are rounded oval in form, dull white, the shell being close-grained, smooth and lustreless. A set taken near Hobart, Tasmania, measures:—Length (A) 1.05 × 0.87 inches; (B) 1.05 × 0.86 inches. Another set measures:—Length (A) 1.05 × 0.89 inches; (B) 1.03 × 0.87 inches.

November until the end of January constitutes the usual breeding season.

Genus *MELOPSITTACUS*, Gould.

Melopsittacus undulatus.

WARBLING GRASS-PARRAKEET.

Psittacus undulatus, Shaw, Nat. Miscel., Vol. XVI., pl. 673.

Melopsittacus undulatus, Gould, Bds. Austr., fol. Vol. V., pl. 44 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 81 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 594 (1891); Sharpe, Hand-l. Bds., Vol. II., p. 41 (1900).

ADULT MALE.—*General colour above greenish-yellow, with narrow black cross-bars, those on the upper wing-coverts being brown and more crescent-shaped in form: outer webs of quills greenish-blue, dark brown on the inner, with a whitish band through the middle of the inner webs of the primaries, the outer webs of the secondaries crossed near their base with a pale green band, the inner webs with a broader yellow band; lower back, rump, and upper tail-coverts grass-green, the latter tinged with blue; central pair of tail-feathers blue, the remainder greenish-blue crossed with an oblique yellow band; forehead and crown of the head straw-yellow; side of face and ear-coverts yellow, with narrow black transverse bars; lores, fore-part of cheeks and throat rich yellow; on the lower cheeks a band of rich deep blue confluent spots, and across the throat three or four rounded black spots; remainder of the under surface, the under wing-coverts, and under tail-coverts grass-green, the latter shaded with blue; bill dull dingy yellow with a bluish shade at the base; cere brilliant blue; legs and feet grey; iris straw-yellow. Total length in the flesh 7.6 inches, wing 3.8, tail 4, bill 0.5, tarsus 0.5.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

IN favourable situations the Warbling Grass-Parrakeet, or more familiarly known "Budgerigar" of bird-dealers and aviculturists, is distributed chiefly over the inland portions of all the Australian States. It is a migratory species, and usually appears in a district after an abundant rainfall, and although breeding generally in the spring and early summer months in Eastern Australia, it will often lay after heavy rain irrespective of season. To a certain extent, too, it is nomadic in habits, and may appear in a district for one or more seasons, and then be

absent again for many years. Gould met with it breeding at Breeza in large numbers in December, and states that formerly it was very numerous on the Lower Namoi River, but during my visits to those districts I never observed it anywhere in that part of the State. It was common on the Castlereagh River, about three hundred and eighty miles west of Sydney, in October, 1905, frequenting and breeding chiefly in ring-barked paddocks, with a profusion of herbaceous plants and tall grasses, in close proximity to surface water and a dam, where they



WARBLING GRASS-PARRAKEET.

frequently used to drink. In common with many other species found near the coast in other parts of Australia, the Warbling Grass-Parrakeet is not found near the sea-board of New South Wales.

The crops and stomachs of specimens examined contained the seeds, or remains of them, of various grasses and herbaceous plants.

It possesses a series of sweet and clear warbling notes. In confinement it is amusing to watch a pair of these birds perched near one another, with heads turned and facing each other. The cheek feathers of the male stand out from the rest of the head, as he volubly pours forth in bird language his affection for his consort, she apparently intently listening, and occasionally uttering a chirruping note. There was a great scarcity of this species in the Sydney bird-dealers' shops for several years, but from 1904, since the break of the great drought in New South Wales, they are as numerous as ever. It is impossible to form any approximate estimate of the large number of this species exported annually to Europe and America, but it must run into many thousands of dozens. The mortality amongst them is great, for they are placed in cages with just sufficient perching room for the occupants to be tightly squeezed in. In

one bird-dealer's place I saw about fifty dead birds that had been taken out of the cages in one morning.

Dr. W. Macgillivray sends me the following note relative to this species in the Cloncurry District, Northern Queensland:—"The Warbling Grass-Parrakeet (*Melopsittacus undulatus*) occurs during some years in prodigious numbers, and generally when the Cockatoo-Parrakeet and "Galah" is also very common. I myself have seen these birds so numerous on the downs country in the nesting season, September, October and November, that every available hollow in standing trees soon become occupied, and recourse was made to hollow logs lying on the ground. I well remember one such occupied from one end to the other with the eggs of these little Parrakeets at all stages of incubation."

Dr. Walter E. Roth, late Northern Protector of the Aborigines, Queensland, thus refers to the mode of capture of *Melopsittacus undulatus*:—"The Budgerigar and other similar small birds are caught with net and alley-way in the Upper Georgina River, and in the Boulia District. Stretching from some waterhole in the neighbouring trees in which these birds have been observed to roost, two long divergent fences are built; these are made with thick bushes, saplings, etc., to a height of some eight to ten feet, and forty or fifty yards long. The space within the narrower portion of the alley is cleared of trees, etc., that in the wider portion being left untouched. In the very early morning a number of men sneak up towards the trees, bushes, etc., thereon remaining, and with many a shout and every kind of noise will suddenly commence throwing sticks and boomerangs into them. The birds being thus driven from their roosts by what they believe to be Hawks, fly low and in a direction opposite to whence the noise proceeds, but not

being able to penetrate the bushes forming the fence, make straight for the waterhole, where they are intercepted in scores by a fine meshed net held up by two men standing just in front of the opening."

Mr. Robert Grant, Taxidermist of the Australian Museum, has handed me the following notes:—" *Melopsittacus undulatus* is very numerous in most of the western parts of New South Wales. In November, 1892, they were exceedingly plentiful at Byrock, the tall strong grasses bending down with their weight as they fed on the seeds. In the early morning I have seen them clustered so close together on branches of dead trees, that at a little distance away it appeared as if the branches were covered with green wool, the birds all the time uttering their clear warbling little song."

The late Mr. K. H. Bennett, of Yandembah Station, near Booligal, New South Wales, wrote:—" *Melopsittacus undulatus* is one of our migratory species, usually arriving early in September and departing again after the breeding season is over in February. Its numbers, however, are greatly influenced by the seasons. After good rains it arrives in thousands, but in dry weather only a few scattered flocks put in an appearance. This increase or decrease of numbers is due to the abundance or scarcity of the various grasses and plants, the seeds of which constitute its sole food. These birds breed in September and October, and I have seldom found less than six eggs in the nesting-place, and sometimes eight. In hot weather they resort to the water morning and evening for the purpose of drinking."

Dr. W. Macgillivray, writing to me of the birds of the Broken Hill District, South-western New South Wales, remarks:—" *Melopsittacus undulatus* passes through this district in the spring, and returns northward towards the end of summer, not breeding here. My first note of flocks arriving here was on the 6th October, 1901, and for a month afterwards they were numerous, large flocks being frequently flushed from the saltbush flats where they were feeding. The next year was very dry, and none appeared at all. In 1903 they were breeding in numbers in April about one hundred and thirty miles north from here, where early autumn rain had fallen, and feed was abundant; that year we did not get any rains until September, and flocks began to pass southward during the last week in October, returning north again early in March. In 1905 I only saw one pair. In 1906 they were passing southward in October, and were again noted going north during the last week in January and the beginning of February."

Referring to a trip made by Dr. W. Macgillivray, in company with Mr. W. McLennan, in the spring of 1909, in South-western New South Wales, the former writes:—"On our trip going northward from Broken Hill we first met with *Melopsittacus undulatus* coming south on the 13th September; after that we met them in greater numbers as we went north; they appeared to be dropping off for nesting purposes wherever suitable conditions obtained. When we arrived at Wyalla Lake, one hundred miles north, on the 19th September, they were choosing their nesting sites in the dead timber in the lake, but no eggs had been laid. In the Box trees which line the watercourses emptying into Bawcannia Lake, numbers of these little Parrakeets were seeking out breeding hollows, but it was not until we returned to Langawirra Station that we found their eggs; here they showed a decided preference for nesting in dead stumps and trees standing round the Box flats rather than green timber. The first eggs were laid about the 26th September, and they were still laying when we left in the first week in October. The hollows chosen were usually from six inches to one foot in depth, with an entrance about one and a half to two inches in diameter, the eggs, four or five in number, resting on the earthy material at the bottom. A few tell tale feathers usually adhere to the entrance."

Mr. G. A. Keartland, of Melbourne, wrote me as follows:—" *Melopsittacus undulatus* is undoubtedly the most sociable of our Grass-Parrakeets. In breeding the nests are close together, and at all times, whether feeding in the grass or visiting their watering places, they are always in flocks. I have looked along the tube of a hollow branch in which about twenty birds were

sitting on their eggs. When they were disturbed, and vacated the hollow, it looked as though a quantity of peas had been strewn through its whole length. It is a pretty sight to see a large flock soaring and circling in the early morning sun, as they turn first back and then breast to the observer. Whilst crossing the Great Desert of Western Australia, I noticed two all yellow birds flying with a flock on their way to water. These birds breed readily in confinement. As soon as one brood is able to feed the old hen lays again. I have reared twenty-one young ones from a single pair in one season. They lay from five to eight eggs for a sitting."

From Tea-tree Gully, near Adelaide, Dr. W. A. Angove wrote me as follows:—" *Melopsittacus undulatus* comes into our hills only occasionally, sometimes in small, at others in very large, numbers. I have not noticed it much of late years, though there are a few at the present time. It nests freely at Mannum in the hollows of the Mallee, and the largest set I have taken is seven eggs."

Mr. Tom Carter writes me from Broome Hill, Western Australia:—" *Melopsittacus undulatus* is very abundant through the North-western portion of this State, especially in wet seasons, when almost every hollow Gum tree limb is occupied by a pair. These birds breed at any season of the year after a fall of rain, doubtless being aware that grass seeds will then be in plenty upon which to rear their young. The Aborigines in the north-west frequently annoyed me very much by their thoughtless cruelty in securing the young birds. A sharp pointed stick was used to impale them as they lay at the bottom of the nesting cavity, and thus transfixed are brought to the aperture, were thrown to the ground, and there collected by the native or his gin and thrown squirming and squeaking on to the hot ashes of a fire, to be cooked alive for a light refreshment. All natives appear to think that animals are quite incapable of suffering pain. About Broome Hill these birds appear to occur mostly when a dry season is prevailing further to the east. Until this summer (1907-8) only odd birds have been noted here, but now large flocks may be seen all over, and the birds were observed to be breeding freely in November and December."

For the purposes of breeding they resort to a hollow spout or limb of a tree, depositing their eggs on the decaying wood, which may be either thirty or forty feet up, or in a hollow log lying on the ground, and often nesting in company in the same hollow. In confinement they will nest almost anywhere, but especially in a dark and obscure position.

The eggs are five or six to eight in number for a sitting, oval or rounded oval in form, some elongated specimens being rather pointed at the smaller end, dull white, the shell being close-grained and lustreless. A set of six taken at Illamurta, Central Australia, on the 20th August, 1895, by Mr. Ernest C. Cowle, measures:—Length (A) 0.73 × 0.57 inches; (B) 0.71 × 0.58 inches; (C) 0.69 × 0.6 inches; (D) 0.69 × 0.58 inches; (E) 0.72 × 0.57 inches; (F) 0.71 × 0.6 inches. A set of five eggs, taken on the 7th June, 1903, by Mr. S. Robinson on BurrenBILLA Station, near Cunnamulla, Southern Queensland, measures:—Length (A) 0.73 × 0.57 inches; (B) 0.73 × 0.59 inches; (C) 0.75 × 0.58 inches; (D) 0.72 × 0.58 inches; (E) 0.67 × 0.57 inches.

Mr. A. P. Kemp, of Quirindi, New South Wales, informs me that during the season of 1908 two pairs of these birds he had in confinement bred under the floor of their aviary, the young birds emerging from the nesting-place when able in twos and threes. Altogether twenty-seven young ones were reared during the season.

In New South Wales the normal breeding season is during October and the two following months, but it may be delayed through drought, the birds then usually breeding after the first heavy rainfall in autumn. Dr. W. Macgillivray records it breeding in numbers in April, 1903, one hundred and thirty miles north of Broken Hill, New South Wales, and in September,

October, and November in the Cloncurry District, North Queensland. During the journey of the Calvert Exploring Expedition in Western and North-western Australia, in 1896, these birds were noted throughout the whole of the country traversed, and numbers of eggs and young birds were found in July and August. At Broome Hill, South-western Australia, Mr. Tom Carter observed it breeding freely in November and December. In South Australia, Dr. A. Chenery informs me he took two sets of the eggs of this species on the 22nd April, 1901, at Arcoona Station, one hundred and forty miles north-west of Port Augusta.

In the bird shops of Sydney in 1908-11 I saw several hundreds of the yellow or yellowish-green form of this species, which M. Octave Le Bon informs me are bred on the Continent, chiefly in France.

Mr. D. Seth-Smith, writing of The Crystal Palace Bird Show of 1911, remarks:—"In the first of the foreign classes, that devoted to Budgerigars, Love-birds and Hanging Parrots, M. Pauwels easily won the first place with his pair of Blue Budgerigars. It is not often a variety or freak is more beautiful than the normal bird from which it is derived, but in this case I think most people will agree that the delicate blue, set off by the white of the face, renders this variety more strikingly beautiful than the normal green, lovely as the bird is. The class for the larger Parrakeets was headed by a very perfect male Black-hooded Parrakeet (*Psephotus cucullatus*), also sent by M. Pauwels."

Genus PEZOPORUS, *Illiger*.

Pezoporus terrestris.

GROUND-PARRAKEET.

Psittacus terrestris, Shaw, Mus. Lev., p. 217, pl. 53 (1792).

Pezoporus formosus, Gould, Bds. Austr., fol. Vol. V., pl. 46 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 86 (1865); Salvad., Cat. Bds. Brit. Mus., Vol. XX., p. 596 (1891).

Pezoporus terrestris, Sharpe, Hand-l. Bds., Vol. II., p. 41 (1900).

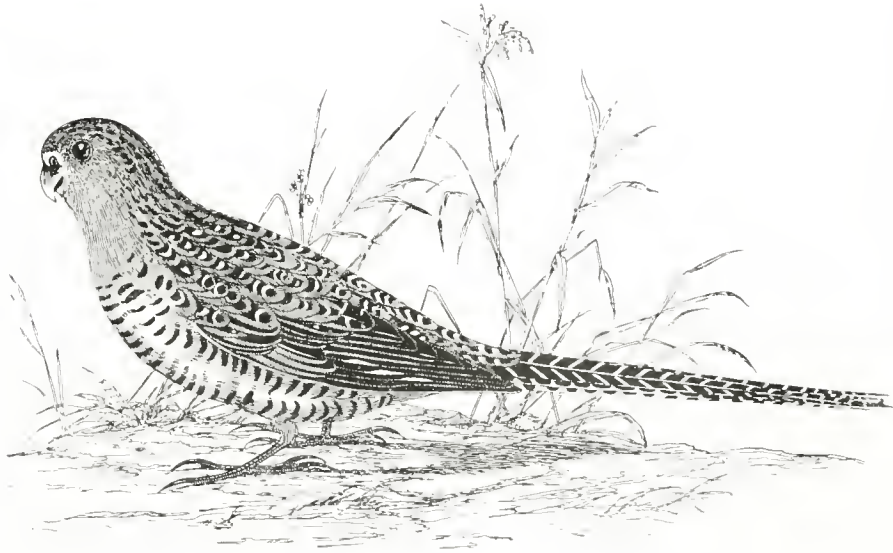
ADULT MALE.—*General colour above dark grass-green: forehead deep reddish-orange; feathers of the head and hind neck with a broad stripe of black down the centre; inter-scapular region, scapulars, upper wing-coverts and back crossed by alternate bars of yellow and black on the centre of each feather; rump and upper tail-coverts similarly but more uniformly barred; quills green on their outer webs, blackish-brown on their inner webs and tips, with a large yellow blotch on the inner web of all the feathers, and a smaller one on the outer web, with the exception of the first, second and third primaries; two centre tail-feathers green shaded with blue on their outer webs and crossed with numerous bars of yellow; the next on either side green on the outer web, blackish-brown on the inner and similarly barred with yellow; the lateral feathers yellow, irregularly barred with dark green on the basal portion of the outer webs and black on the inner webs and tips; centre of the throat yellowish-green; sides of the face and neck and the chest grass-green, with narrow black shaft lines; breast and sides of the abdomen yellowish-green, with irregular cross-bars of black, less distinct on the centre of the abdomen; under tail-coverts greenish-yellow, barred with black; bill slaty-horn colour; legs and feet slaty-brown; iris buffy-white. Total length in the flesh 12.6 inches, wing 5.3, tail 8, bill 0.62, tarsus 0.98.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—New South Wales, Victoria, South Australia, Western Australia, Tasmania, Islands of Bass Strait.

* Avic. Mag., Third Ser., Vol. II., p. 154 (1911).

THE range of the Ground, or "Swamp" Parrakeet, extends from New South Wales right across the Australian Continent to the south-western portion of Western Australia, and also extends to some of the islands of Bass Strait and to Tasmania. It is, however, chiefly an inhabitant of the coastal districts, over which, in favourable situations, it is somewhat sparingly distributed. Swamp lands, more or less covered with rushes or grass tussocks, are its usual haunts, or low scrub-clothed wastes, heath lands, and less frequently it is found in open forest-lands. As pointed out by Gould, it emits a strong scent, and dogs readily stand to it, as to any other game-bird, its flesh being excellent for table purposes. Although it is still found in the neighbourhood of Sydney, principally at the Botany Water Reserve, Maroubra, Long Bay and the Quarantine Grounds at Manly, on the North Head of Sydney Harbour, its numbers have greatly decreased of late years. In the neighbourhood of Appin, about forty miles south of Sydney, Dr. E. P. Ramsay informed me this Parrakeet used to breed in the long tussocky grass during September, October and November, and that the young birds afforded good sport about the end of January. It must have been a great resort of this species, for at Madden's Plains, in



GROUND-PARRAKEET.

the near vicinity, the late Mr. J. A. Thorpe, while collecting on behalf of the Trustees of the Australian Museum in August, 1885, brought back with him a series of thirty-eight beautiful adult skins of both sexes. As will be seen by Mr. Grant's notes, he procured the Ground-Parrakeet on the Blue Mountains. In Victoria I noted this species at Maribyrnong, near the Saltwater River, also on the Keilor Plains. In the former locality the birds were quietly feeding on the grassy sward, and on my closely approaching them flew on to the top of a three-railed fence, the only time I have observed this species perch.

Mr. Robert Grant, Taxidermist of the Australian Museum, has handed me the following notes:—"In my wanderings on the Blue Mountains, from Katoomba to Lithgow, I have only seen the Ground Parrakeet (*Pezoporus formosus*) in one place, on a swamp on Mount Edgcumbe Estate, about a mile from the famous Zig-zag. In September, 1881, while going through some scrub near the swamp, my dog flushed a Ground-Parrakeet, and shortly afterwards another, both of which I shot, and which proved to be male and female. About a month after I visited the same spot and flushed another bird, but failed to obtain it. Those were the only occasions I have ever found the Ground-Parrakeet on the Blue Mountains. I have shot it at Yarra.

near La Perouse, also between Narrabeen and Manly, but I am afraid that the numerous Quail shooters have killed most of them in these parts."

Mr. Percy Peir, of Campsie, near Sydney, sends me the following notes:—"About 1885 I had a pair of Ground-Parrakeets (*Pezoporus formosus*) which were caught near a swamp, the present site, of the Kensington Racecourse, close to Sydney. They lived for some years, but were rather uninteresting, never perching, but always spent their time on the ground. I have seen these birds on and off since that time, and often found tail-feathers scattered about near the edges of swamps at the back of Long Bay and Botany, the birds evidently having fallen victims to Native Cats or other enemies. I was in company with Mr. T. Whitelegge when he found a nest and three eggs at Maroubra. The nest was situated in a swampy flat, not far from the Long Bay road, and although left untouched for a week, no more eggs were laid, the birds evidently having deserted the nest. I saw a pair about two years ago, near a swamp close by Newcastle Racecourse, and at the local Agricultural Show a rather rough specimen was exhibited and catalogued as a 'Madden's Prairie Parrot.'"



GROUND-PARRAKEET'S NEST AND EGGS.

From notes made by Dr. L. Holden, in Tasmania, I have extracted the following:—" *Pezoporus formosus* is always found in the open, in swampy heath lands, or turnip fields. It takes very short flights and dodges about on the wing; when it alights it runs for some distance before rising again. It is often flushed by Quail shooters. Mr. E. D. Atkinson, while riding, found a nest on the 12th October, 1886, on Mount Cameron plain, near Montagu. It was in heathy ground, under a tussock of button grass, and well concealed; the earth had been scratched out to a deep cup shape and then lined with dry coarse grass. It contained three beautiful white rounded eggs, quite fresh. The bird was flushed off and almost underneath the horse's feet. Seven more birds were flushed, but no other nest found. Mr. Atkinson says these birds generally run from the nest a short distance before rising when they are disturbed. I hunted over the big plain at Montagu on the 31st October, 1886, for the nest of this species, but without success, and flushed these birds. On the 10th June, 1887, I saw one on the swampy edge of the Eastern Inlet. In March, 1900, I saw one at Wentworth, Bellerive, near Hobart. I flushed it beside the path leading to the house, and it flew into a maize field adjoining the garden."

Mr. E. D. Atkinson writes me as follows from Waratah, Mount Bischoff, Tasmania:—"I have often seen *Pezoporus formosus*, locally known as the "Swamp Parrakeet," when riding over the plains in the north-west part of Tasmania; also in the open country on Flinders Island and the Hunter Group in Bass Strait. When flushed it flies quickly, taking a zig-zag course, and darting to the ground again at a short distance. I have never yet seen it perch."

A nest taken at Middle Harbour, Sydney, in 1879, containing three eggs, is composed of rushes and wiry grass, bitten into suitable lengths and bent round and interwoven here and

there into a platform of about half an inch thick, a piece of *Lycopodium* also being worked into it. The nest and eggs here figured were found by Mr. T. Whitelegge, at Maroubra, about three miles south-east of Sydney, in November, 1897. It was built at the base of a thick clump of rushes and *Lycopodium*, growing on a low hillock in a swamp, and is formed entirely of thin dead rush and fern stems, and averages externally six inches and a half, the egg cavity measuring three inches and a half in diameter by three quarters of an inch in depth, and was entirely protected overhead by rushes and ferns, the birds entering the nest on the side at the base of the tuft of rushes. Visiting the nest on the 21st November, when quite close to it Mr. Whitelegge encountered a large Black Snake (*Pseudechis porphyriacus*), which with some difficulty he killed. On reaching the nest he found that it contained three cold and apparently deserted eggs, for no birds were seen in the vicinity. Taking the eggs, a board was placed under the tuft of rushes and ferns, and the whole now forms an interesting group in the Australian Museum.

The eggs are usually three in number for a sitting, oval or elliptical in form, pure white, the shell being smooth, close-grained and more or less lustrous. A set of three taken at Middle Harbour, Sydney, in 1879, measures:—Length (A) 1.03 × 0.85 inches; (B) 1.01 × 0.85 inches; (C) 1.06 × 0.85 inches. A set of three taken at Maroubra on the 21st November, 1897, measures:—Length (A) 1 × 0.85 inches; (B) 1.05 × 0.82 inches; (C) 1.01 × 0.8 inches. Two eggs received from Mr. E. D. Atkinson, while resident at Table Cape, Tasmania, measure:—Length (A) 1.12 × 0.9 inches; (B) 1.13 × 0.9 inches.

Young birds resemble the adults, but have not the orange band on the forehead; the feathers, too, have a yellowish shade, which is more pronounced on the upper wing-coverts, orbital region, sides of the neck, throat and chest, the feathers of the latter two having one or more blackish spots or cross-bars in the centre. Wing 4.75 inches.

September and the three following months constitute the usual breeding season of this species.

Specimens from Western Australia may readily be distinguished from examples procured in Eastern Australia, by the broken barrings on the under surface, the centre of the lower breast and abdomen being yellow. This is very pronounced in adult specimens in the Australian Museum Collection, obtained by Mr. George Masters at King George's Sound, Western Australia, in 1866 and 1868. I purpose to distinguish this form from Western Australia under the name of *Pezoporus flaviventris*.

ORDER ACCIPITRES.

Sub-order FALCONES.

Family FALCONIDÆ.

Sub-family ACCIPITRINÆ.

Genus CIRCUS. *Lacépède.**Circus assimilis.*

SPOTTED HARRIER

Circus assimilis, Jard. and Selby, Ill. Orn., Vol. I., pl. 51 (1826); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 63 (1874); *id.*, Hand-l. Bds., Vol. I., p. 245 (1899).

Circus jardinii, Gould, Bds. Austr., fol. Vol. I., pl. 27 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 60 (1865).

ADULT MALE.—*General colour above pale bluish-slate colour, the upper tail-coverts edged with white at the tip, and crossed with two or three broken spot-like white bars; wings like the back, the apical half of the outer primaries brownish-black, their darker tips becoming smaller and paler on the inner primaries and the secondaries, the remaining portion of the quills crossed with dark brown bars, which are more conspicuous on the under surface of the wing, this portion being ashy-white; the inner lesser upper wing-coverts dull brick colour, finely spotted with white, these spottings being larger and more distinct on the remainder of the upper wing-coverts and scapulars; tail-feathers ashy-grey with dull whitish tips, and crossed with six or seven blackish-brown bands, which are paler towards the base; crown of the head and ear-coverts chestnut, the former broadly streaked with dark slaty-grey; facial ruff and sides of the neck pale bluish-grey; remainder of the under surface, under wing and under tail-coverts rufous, with a row of rounded white spots on both webs, those on the upper portion of the body and flanks in some specimens narrowly margined with dull slaty-grey; some of the longer upper wing and under tail-coverts dull white with intermingled dull slaty-brown and rufous cross-bars; bill black, bluish at the base; cere greenish-lead colour; legs and feet yellow; iris yellow. Total length in the flesh 20 inches, wing 15.7, tail 10.5, bill 1.2, tarsus 3.5.*

ADULT FEMALE.—*Similar in plumage to the male, but larger. Total length in the flesh 23.5 inches, wing 18, tail 12, tarsus 4.*

Distribution.—North-western Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia.

THE Order Accipitres is usually a favourite one with Ornithologists and Oologists. To the former, with the many varying changes of plumage from youth to maturity in Australia, notably in the genera *Circus*, *Astur* and *Accipiter*; to the latter, by the many richly marked and brilliantly coloured eggs, as are exhibited in *Hieracidea*, *Falco*, *Gypfictinia*, *Lophoictinia*, and *Pandion*. Interest also attaches to the nidification of many species, who breed harmoniously together in close company, in others who seldom build at all, or use the deserted tenement of another bird, and which may be occupied in a single season by three or more species. Many of them, too, who prey to a large extent on mammals, also on other birds, are beneficial in killing reptiles and many injurious insect pests. The Wedge-tailed Eagle, the largest and most powerful of our Australian birds of prey, in districts where there is a paucity of its natural food, is undoubtedly destructive, especially in the lambing season, but this is more than counterbalanced by keeping in check the rabbit pest where these rodents occur.

HEREWITH is issued Part III. of Volume III. It is a continuation of the Order Accipitres, and contains the Sub-family Accipitrinæ, commenced on the last page of the preceding Part, the Sub-family Buteoninæ, and the greater portion of the Sub-family Aquilinæ. The figures of eggs, which are of the natural size, were reproduced by the heliotype process at the Government Printing Office, from photographs of the specimens, taken under the direction of the Government Printer and the supervision of Mr. A. E. DYER. As in the previous Parts, the illustrations of birds are reproduced from drawings made by the late Mr. NEVILLE CAYLEY, who was also responsible for hand-colouring the Plates of Eggs in the coloured copies.

R. ETHERIDGE,
CURATOR.

AUSTRALIAN MUSEUM, SYDNEY.

31st October, 1911.

The Spotted Harrier is widely distributed in favourable situations over the greater portion of the Australian Continent. In the Australian Museum Collection there are specimens obtained by Mr. George Masters at King George's Sound, in Western Australia, and by Mr. E. J. Saunders, thirty-six miles south-west of Roeburne, in North-western Australia. By far, however, the greater number were procured in New South Wales, and notably among others by the late Mr. K. H. Bennett, in the Lachlan River District, who secured young in down, and semi-adults and adults of both sexes; specimens were also received from Goulburn, presented by Mr. A. M. N. Rose, and from Botany, procured by Mr. H. Burns.



SPOTTED HARRIER.

In New South Wales it is essentially an inhabitant of the large inland grassy plains, but is occasionally met with in scrub-covered wastes near the coast. I noted it very numerous in November on the plains between Breeza and Narrabri, usually flying just a few feet above the tops of the waving sea of luxuriant grass in search of prey, ever and anon dropping into concealment as it secured, perchance, some hapless bird or small mammal. When soaring not too high, one can usually distinguish this species when on the wing by the lighter colour of the under surface of the wings, and its distinctly barred tail. As a rule, however, it is shy and does not admit of too close an approach.

The food of the Spotted Harrier consists usually of small birds, mammals and reptiles. The stomach of one I examined, shot at Randwick, contained a mouse and the remains of a number of insects.

Apart from the great variation in the young and adult of this species, a great difference may be observed also

in individual adult specimens. Some have the entire under surface spotted with white, others have the foreneck pale bluish-slate colour like the facial ruff.

The late Mr. K. H. Bennett, while resident at Vandembah Station, near Booligal, New South Wales, wrote me:—" *Circus assimilis* is in these parts of migratory habits, usually arriving about the end of August and departing again after breeding, about February. It frequents the plains and open country, being rarely found in thick timber, and it preys chiefly upon small reptiles and such birds as Quail, Larks, &c., to which is added large insects such as grasshoppers and Mantis. The nest, which is generally placed amongst the dense branches of some small tree, is a loosely built structure composed of small sticks, almost flat, and lined with a few green Eucalyptus leaves, and usually about twenty to thirty feet from the ground. It lays two or three eggs. This bird nests about the middle of September or October, the young birds leaving the nest usually about the end of November or December. It constructs a fresh nest every year. On the 24th September, 1889, I found a nest built in the top of a Pine about twenty feet from the ground, containing two fresh eggs, and on the 16th September, 1890, I

found a pair of these birds building in a similar position, from which I took three slightly incubated eggs on the 4th October. In this small clump of about a dozen Pines (*Callitris*, sp.) four other species of Accipitres were all breeding at the same time, viz., Brown Hawk (*Hieracidea orientalis*), Whistling Eagle (*Haliastur sphenurus*), Allied Kite (*Milvus affinis*), and Nankeen Kestrel (*Tinnunculus cenchroides*). On the 18th October I took four eggs of *Circus assimilis* from the same nest I took three eggs on the 4th instant; this is the first instance I have ever found more than three."

From Orange, New South Wales, Mr. E. H. Lane writes me:—"For the first time in his experience Mr. F. Burcher saw *Circus assimilis* in the Mossgiel District in 1905, the season being very good, and all the swamps full of water. He robbed no less than seven nests, six of which had three eggs and one only two eggs. The nests were rather flat structures, lined with green leaves, and placed either in mistletoes or other bushy parts of the trees. The three sets I received were taken on the 1st, 6th and 23rd September, 1905. Mr. Burcher forwarded me a skin of this bird with them, which I sent you for identification."

From Broken Hill, South-western New South Wales, Dr. W. Macgillivray sends me the following notes:—"Examples of *Circus assimilis* may often be seen sailing and flapping their way slowly over the plains in search of food. On the wing they are easily distinguished from their congeners by the general light grey colour, and when seen from underneath, the black tips of the wings serve still further to distinguish them. Although much commoner than *C. gouldi*, I have not yet come across a nest."

From Melbourne, Victoria, Mr. G. A. Kearnland sends me the following notes:—"The Spotted Harrier (*Circus assimilis*) has a very wide range extending from Southern Victoria to North-western Australia. These birds are usually seen flying slowly close to the ground, ready to pounce on snakes, lizards, rabbits or mice, and immediately their prey is secured they commence tearing it to pieces and swallowing it. In North-western Australia I saw many of them hunting in the Spinifex for rats, lizards and jerboas, which were numerous. I found a nest containing three eggs in the horizontal branch of a desert Gum about twenty feet high. At Nhill, Victoria, a pair of these birds were flying slowly just over the tops of the Mallee bushes in quest of rabbits, passing within a few feet of where I stood watching other birds. That they are very bold was proved whilst the late Mr. W. P. Henderson and I were rabbit shooting above a railway embankment at Beveridge, Victoria. We had just put a ferret in a hole at the bottom of the bank, whilst we stood on top waiting for a shot, when we noticed a Spotted Harrier standing on a fence about sixty yards away. Three or four times it flew to the ground, and appeared to be attacking something. Then we found that it was trying to lift a large rabbit hiding in the long grass, but the rabbit eventually escaped into a hole. Just then the white ferret ran along the bottom of the bank, and the Harrier made a dash for it, but fell a victim to our guns when it was within fifteen feet of where we stood."

Mr. Tom Carter sent me the following note from Broome Hill, Western Australia:—"The Spotted Harrier (*Circus assimilis*) was one of the commonest birds of prey about the North-west Cape, North-western Australia, but of wary habits, and not easily secured. On hot days they will seek the shelter of densely foliated trees or bushes, and may then be approached closely. The main food appears to be lizards, but I have seen birds (of immature plumage only) attack poultry near the house in a determined manner. By far the greater majority of this species seen are in immature plumage, only about one bird in a dozen having the handsome spotted feathers. They were observed most frequently in the winter months, doubtless because it was usually our wet season, and food would be more abundant. The large flat nests are built in low or high trees, and I have noted eggs in nests built at various elevations above the ground, from eight to forty feet. The usual clutch of eggs is three, but I once took four eggs from a nest. Eggs were noted on various dates between July 17th and September 13th. Lizards of considerable size,

and in a paralysed state, were not infrequently found in the nest, no doubt placed there for the benefit of the sitting bird."

The nest is a nearly flat structure, the basis formed of sticks and twigs, and the cup-shaped depression in the centre lined with *Eucalyptus* leaves. It is built in a thick bushy tree at a height varying from five to forty feet from the ground.

The eggs are usually three, sometimes only two, and rarely four in number for a sitting. They vary from oval to rounded ovals in form, specimens being occasionally found tapering somewhat sharply at the smaller end, of a dull white or faint bluish-white, rather coarse shelled, dull and usually lustreless, the inner surface of the shell dark green, the outer surface in places generally more or less nest-stained, and usually of a pale brown or yellowish-brown hue. A set of two taken by the late Mr. K. Bennett, on Yandembah Station, on the 24th September, 1889, measures as follows:—Length (A) 2.01 × 1.57 inches; (B) 1.95 × 1.57 inches. A set of three taken by him in the same locality on the 4th October, 1890, measures:—Length (A) 1.93 × 0.51 inches; (B) 2.04 × 1.5 inches; (C) 2.02 × 1.47 inches.

A young one taken from the nest by the late Mr. K. H. Bennett on the 23rd December, 1879, from a tree on the Lachlan River, New South Wales, has the head, lower back and rump covered with dull ashy-grey down, intermingled with some rich rufous feathers on the hinder crown, hind-neck and back, centred with dark brown; the upper wing-coverts and scapulars paler and having the apical portion of the feathers rufous; quills and tail-feathers brownish-black, slightly tipped with pale rufous, all the under surface covered with dull whity-brown down, scattered rufous feathers with a blackish shaft streak occurring on the chest and breast, and light fawn downy feathers on the abdomen, thighs and under tail-coverts. Wing 8.3 inches.

Young birds that have long left the nest exhibit almost the same plumage as the nestling, but the rufous tips to the feathers of the upper parts are much smaller and paler, the tail-feathers are brown, indistinctly barred with darker brown, and the head and ear-coverts are pale rufous and the feathers of the former are centred with dark brown; the under surface is pale rufous-buff with narrow blackish shaft-lines, and passing into buffy-white on the thighs and abdomen. Wing 14.7 inches.

Semi-adult birds of both sexes resemble adult birds, but have narrow rufous and white tips to the scapulars, and the markings on the under surface instead of being rounded white spots are joined together and form a whitish streak down each web of the feathers. Wing 15 inches.

In New South Wales September and the three following months constitute the usual breeding season, the late Mr. K. H. Bennett finding unfledged young at the latter end of December. In Western Australia the Calvert Exploring Expedition obtained eggs near the Camel Depot on the 18th August, 1896, and again during the journey on the 26th September. In North-western Australia Mr. Tom Carter has taken eggs, at Point Cloates, from the 17th July to the 13th September.

Circus gouldi.

GOULD'S HARRIER.

Circus assimilis (nec Jard. and Selby), Gould, Bds. Austr., fol. Vol. I., pl. 26 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 58 (1865).

Circus gouldi, Bonap., Consp. Av., tom. I., p. 34 (1850); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 72 (1874); *id.*, Handl. Bds., Vol. I., p. 246 (1899).

ADULT MALE.—General colour above dark brown, the feathers of the head, hind neck and mantle with reddish-rufous margins, the upper wing-coverts and scapulars with rufous-brown margins.

quills blackish-brown, the outer webs of the primaries and outer secondaries dull grey, passing into fulvous on the margins of their inner webs and indistinctly barred with dark brown, their tips narrowly edged with ashy-white, except the three outer primaries, which also have the apical portion of their outer webs blackish-brown: rump feathers a slightly paler brown, with rufous tips; upper tail-coverts white, with a subterminal rufous brown bar, less distinct on the shorter ones: tail greyish-brown, washed with rufous, which is more distinct on the lateral feathers, and almost obsolete on the central pair, and having the remains of dull blackish-brown cross-bars; upper throat and ear-coverts pale rufous-brown, the latter with dark brown shaft streaks; facial ruff white with a broad blackish-brown stripe, narrowly edged with rufous-buff down the centre of each feather; all the under surface, thighs, under tail and under wing-coverts fulvous-white with a distinct rufous-brown stripe down the centre of each feather, broader and more lanceolate in shape on the upper breast, and reduced to a narrow shaft line on the thighs: bill blackish-slate colour; cere greenish-yellow; legs and feet greenish-buff; iris yellow. Total length in the flesh 22.5 inches, wing 16, tail 9.1, bill 1.3, tarsus 3.85.

ADULT FEMALE.—Similar in plumage to the male, but slightly larger. Wing 17.25 inches.

Distribution.—Queensland, New South Wales, Victoria, South Australia, Western Australia, Tasmania.

GOULD'S Harrier, or the more familiarly known "Swamp-Hawk" is widely distributed in suitable localities over the southern half of the Australian Continent, and is likewise found in Tasmania and New Zealand. In Gould's folio edition of the "Birds of Australia" it is figured under Jardine and Selby's name of *Circus assimilis*, but the bird figured and described by these authors in their "Illustrations of Ornithology" refers to the young of the preceding species, of which Gould figures and describes the adult form under the name of *Circus jardini*.

The present species is chiefly an inhabitant of the coastal districts, frequenting principally rush or reed-bordered swamps, tea-tree marshes, mangrove flats, reed beds and lagoons. It also haunts adjacent open wastes, where it obtains part of its food, which is of a varied character. Generally it may be seen flying just over the tops of the reeds or rushes, or a few feet above the ground. It soars also high in the air, gyrating slowly as if in search of prey, and then descending rapidly, flying perchance for some distance before it rests on some log or stone. In my early collecting days this species used not to be uncommon in the neighbourhood of Melbourne, at that time a great resort of waterfowl, before some of the low-lying lands were drained, and put to use. I refer more particularly to the present Albert Park Lake, then in its primitive state, and Middle Park, where I have shot many species of waterfowl, but is now thickly covered with houses, and the present ornamental lake in the Botanic Gardens, at that time almost solely a tea-tree swamp. It was at the latter locality that I witnessed principally the many graceful evolutions and aerial flights of Gould's Harrier, but known to us bird-nesting boys only as the "Swamp Hawk." I have many a time watched this Harrier swoop down on a Black Duck (*Anas superciliosa*) while swimming with her brood of young in down on the lake, and which all disappeared like magic, by suddenly diving, as the Harrier swept over the spot occupied by the Duck and her brood a second or two before. A far more exciting sight was it to watch Harriers successfully disturb one of the vast flocks of Nankeen Night Herons (*Nycticorax caledonicus*) that every evening during the late summer months used to roost on the tops of the tea-trees at the eastern end of this sheet of water, and with a lightning-like dash clutch or strike in mid air the bird it had singled out as its prey. Once I saw a Heron struck; it uttered a harsh piercing shriek, and fell in a slanting direction among the low tea-trees near the margin of the water, to be followed by the Harrier, who descended in the scrub, and doubtless devoured its prey at leisure. It was in this locality that I first saw a nest of the "Swamp-Hawk," from which the eggs were taken about a week before by the boys who showed it to me. Later on I met with this species in the mangrove flats of Western Port Bay, where I secured its eggs.

Near Sydney Gould's Harrier may be occasionally met with about Randwick and the Botany Water Reserve, also the rush-covered flats of Narrabeen Lagoon. Although this species will kill a full grown Duck or Coot, it does not hesitate to prey upon many of the smaller ground frequenting birds, small mammals, reptiles and various kinds of insects. The stomach of a bird examined, shot at Randwick, contained the remains of an Australian Pipit (*Anthus australis*), and another procured at Botany several more or less perfect lizards and portions of insects. Mr. J. A. Boyd, while resident at Ripple Creek, Herbert River, North-eastern Queensland, wrote me:—"I may mention that the Fijian *Circus* (*C. wolfi*) is a great egg eater, and devours large numbers of those of fowls and turkeys. I have caught many, using an egg for bait, and have shot them so full of this food, that yolk has poured out of their mouths like honey from a 'Blue Mountain Parrot.'" According to Gould it also eats eggs.

This species exhibits the usual variation in plumage between youth and maturity. The former may generally be distinguished by their more uniform and darker colouring, and if one is near enough by the white nape spot. In the adults principally by the lighter plumage of the under surface and tail, and the almost pure white upper tail-coverts. In the Australian Museum Collection are specimens from different parts of New South Wales, but principally from the coastal districts; from Victoria, Tasmania and King George's Sound, Western Australia, the latter procured by Mr. George Masters in October, 1868.

Writing me from Swan Creek, Ulmarra, in the northern coastal district of New South Wales, Mr. R. Williams remarks:—"In close proximity to a number of Straw-necked Ibis nests found in this district in October, 1900, I discovered and flushed a Swamp Harrier from her nest, which was built in a thick clump of reeds at a height of about three feet above the water. The nest was a simple structure formed by bending the reeds towards a common centre, which was about four inches below the fracture of the reed. This concavity, lined with grass, formed the nest which contained two eggs."

The late Mr. K. H. Bennett sent me the following notes when resident at Yandembah Station, near Booligal, New South Wales:—"Although by no means numerous, *Circus gouldi* may be met with in this locality all the year round, but only where there are swamps affording shelter for waterfowl, which, with their young, constitute portion of its food. It is much fiercer and more rapacious than *Circus assimilis*, and does not hesitate to attack birds of larger size, such as Ducks, Waterhens and Coots. It has a curious habit in the mode of descent from an immense height above a swamp or reed-bed, and in uttering shrill screams while so engaged. Usually the first indication of the presence of this Harrier is its wild and piercing note, and on looking up the observer sees the bird high up in the air performing the most extraordinary evolutions, tumbling head downwards for a long distance as if wounded, then suddenly shooting upwards for a little way, which is repeated several times, but gradually getting nearer all the time to the surface of the swamp, when this erratic flight ceases, and it perches either on the top of the reeds or some branch projecting above them. Here the bird rests for some time, then commences its quest for prey by flying slowly and stealthily just above the tops of the reeds or rushes, carefully scrutinizing each small patch of open water or the swamp. On one occasion I saw one pounce on a Black Duck (*Anas superciliosa*) in some open water amongst the reeds. The unfortunate Duck at once dived, but the Harrier, expanding its broad wings, effectually prevented the Duck from drawing the former under the water, and it could only swim about at a certain depth until it was drowned. When this was accomplished the Harrier, by gently flapping its wings, steered the prey to a small partly submerged log, and then letting go the dead Duck rose to the surface. Stretching out one of its long legs, he soon had it on the log, and commenced to eat it, but as the fun was now over I determined to have the Duck, which I quickly confiscated. On two occasions I have found the nests of *Circus gouldi*, and in both instances they were formed of sticks loosely placed together on the top of

thick salt-bushes in a swamp, and about four feet from the surface of the shallow water. One contained two eggs, the other, which I found in November, two young ones almost ready to fly, and of a uniform dark sooty colour. The old birds do not return to the nest in the following seasons."

Dr. W. Macgillivray sends me the following notes from Broken Hill, in South-western New South Wales:—" *Circus gouldi* is not often seen, in fact I had not seen any until September, 1909, when a pair were searching a *Polygonum* swamp near Bancannia for prey, and again another was noted at Langawirra over the crop."

From Melbourne, Victoria, Mr. G. A. Keartland writes me:—" I believe the Swamp Harrier (*Circus gouldi*) is more numerous in Victoria than elsewhere, but still it has a fairly wide range. They are partial to flat country and cornfields. On several occasions I have found thin stick nests on the ground amongst the standing corn at Melton and Werribee. They live principally on frogs, snakes and lizards. At Benjeroop Mr. J. Gabriel saw three eggs belonging to a pair of these birds roll out of a sheaf of corn as it was tossed aside by the reaper and binder."

From Adelaide, South Australia, Dr. A. M. Morgan has sent me the following notes:—" *Circus gouldi* is a fairly common bird in the southern parts of South Australia. I have not met with it personally further north than Laura, where it was about equally common with *Circus assimilis*; of the latter bird I have received a skin from as far north as Leigh's Creek. *C. gouldi* was a fairly common bird at Geelong, Victoria, and in 1884 I took a nest, containing five eggs, in the samphire flats, near where the rifle butts used to be; one of the eggs was much smaller than the others. On the 2nd November, 1898, my brother, Mr. E. R. Morgan, took six eggs from a nest at the Finnis River. On 17th November, 1898, I visited the nest, and took a seventh egg from it. The nest was built in a clump of bamboo reeds growing well out in a swamp. It was composed of dry reeds and spear grass, and was about two feet from the ground, the birds having chosen a dry spot to build over. Most of the nests I have found have been built on dry land, generally in rushes or a standing crop. One nest I found near the Finnis River was in a small clump of rushes standing out on a bare plain; this nest was empty; they are late breeders here, the earliest clutch in my collection being taken on 2nd November, 1898, and the latest 12th December, 1898. They live here chiefly on Ducks and wading birds, which they pounce upon as they skim the reed beds. On several occasions on Lake Conewarree and Lake Alexandria I have flushed a bird from a half eaten Black Duck or Teal."

Mr. Malcolm Harrison writes me as follows from Hobart, Tasmania:—" The "Swamp Hawk," *Circus gouldi*, Bonap., the *C. assimilis* of Gould's "Birds of Australia," is very common throughout Tasmania in swampy country, and consequently the white eggs are by far the commonest of those of all the Accipitres, partly from the number of the birds, but mostly from their habit of nesting on the ground. They seem to have no predilection as to their nesting site, and I have found them equally ready to nest in the reeds on a swamp, on clumps of Saggs in the bush, in growing crops, &c. On the Derwent Swamps below New Norfolk, where they are always to be seen hunting, I have frequently seen the Bald Coots making desperate but clumsy efforts to attack them in the air in defence of their young."

From notes made by Dr. Lonsdale Holden while resident in Tasmania, I have extracted the following:—" On the 29th October, 1886, I brought home one out of eleven *Circus gouldi* that had been recently trapped, and nailed to an outhouse, on the Western Plains, Circular Head. I noticed that the colour of the rump and the abdomen varied a good deal on these birds. I chose one of the darkest I could see. It was a female with a well-developed egg in the ovary, extremely fat, and had the fur and skull of a mouse in the stomach. On the 15th November, 1886, I found a nest of *Circus gouldi* in a swamp near Circular Head Peninsula. It was almost flat, and a very untidy structure formed of twigs, dried ferns, lined with hay, and placed on a

large grass tussock among logs and green herbage, with water all around. It was well in the middle of the swamp, which is thickly studded with high tea-trees. The nest was about two feet and a half across, and the inner lined portion a foot in diameter, and contained two eggs; also the hind leg of a hare. I had climbed to the top of a tree to examine a Crow's nest, when the Harrier flew off her nest. Both of the Harriers flew overhead while I was taking the eggs, in evident anxiety, but uttered no noise. In November, 1891, four eggs of this species were taken in a swampy place near Greenhills, and the bird shot. On the 13th November, 1904, I found a nest among rushes in a lagoon near the Derwent River, in South-eastern Tasmania. The nest was well out in the centre of the bed of rushes, which occupies near the whole of one end of it. This nest was outwardly formed of dry sticks, briars and pieces of bark, some as long as a man's arm, the interior was cup-shaped, and tidily lined with dry grasses, and measured about a foot in diameter. It contained four eggs, and the bird sat very close, but flew right away in silence when flushed."

Mr. E. D. Atkinson sent me a note that his brother, the Rev. H. D. Atkinson, of Evandale, Tasmania, has taken eggs, which are five or six in number for a sitting, from the 1st November to the 1st December, and that about Evandale and other parts of the midlands *Circus gouldi* builds in wheat fields.

Circus gouldi is very numerous in South Australia. At the Finnis River, fifty miles south-east of Adelaide. Dr. A. M. Morgan found four nests all in reeds. The nests were built chiefly of a kind of sword grass, and lined with broken bits of dead bull-rushes. They were supported by the reeds, and measured about two feet six inches in diameter. At the "Reed-beds," about seven miles from Adelaide, Mr. W. White found it breeding on several occasions, and sent me two eggs taken in October, 1883, from a nest built among lucerne. From Tasmania Dr. L. Holden sent me a set of two incubated eggs taken by him at Circular Head on the 23rd December, 1893, from a nest he found in long grass in a meadow, and without bushes or water near it.

The eggs are usually three, occasionally only two, and not infrequently four or five, and rarely six in number for a sitting; the higher numbers are not uncommon in South Australia and Tasmania. In Victoria I saw a set of five eggs in Mr. Chas. French, Junr.'s, collection, taken by Mr. G. E. Shepherd, at Somerville. Usually they are rounded-oval in form, but ellipses are sometimes found; they are a uniform dull or a very faint bluish-white, the inner surface of the shell green; rather rough shelled or finely granulate, and usually less nest-stained than are those of the preceding species; some are entirely lustreless, others have a slight gloss. A set of two taken by the late Mr. K. H. Bennett, at Yandembah Station, New South Wales, on the 15th September, 1889, measures:—Length (A) 1.97 × 1.5 inches; (B) 1.95 × 1.55 inches. A set of two taken by Dr. Lonsdale Holden, at Circular Head, Tasmania, on the 23rd December, 1893, measures:—Length (A) 1.94 × 1.55 inches; (B) 2.07 × 1.53 inches. Incubation was in an advanced stage in both of these sets, although each contained but two eggs. A set of three taken by Mr. G. E. Shepherd, at Somerville, Victoria, on the 29th October, 1893, measures:—Length (A) 1.87 × 1.58 inches; (B) 1.92 × 1.52 inches; (C) 1.96 × 1.49 inches.

Young birds are dark chocolate-brown above, the upper wing-coverts and primary-coverts narrowly edged at the tips with rufous-buff, upper tail-coverts dark brown tipped with rufous, the secondaries with pale buff; tail-feathers dark brown slightly washed with rufous; feathers of the nape white at the base, and centred at the tip with dark chocolate-brown, the remainder of the apical portion of the feather reddish-fulvous; all the under surface chocolate-brown, with a blackish-brown shaft-streak. Wing 15 inches. A very richly-coloured specimen from Victoria is almost uniform dark chocolate-brown above and below, the thighs alone being of a pale chocolate-brown hue. Wing 15.5 inches.

The breeding season usually commences early in September, and continues until the end of January.

Genus *ASTUR*, *Lacépède*.**Astur clarus.**

GREY-BACKED GOSHAWK

Falco clarus, Lath. Ind. Orn., Suppl. II., p. xiii. (1801).

Sparvius cinereus, Vieill., Nouv. Dict. d'Hist. Nat., Tom. X., p. 338 (1817).

Astur nova-hollandiæ, Gould, Bds. Austr., fol. Vol. I., pl. 11 (1848).

Leucospiza raii, Gould, Handbk. Bds. Austr., Vol. I., p. 37 (1865).

Astur cinereus, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 117 (1874); *id.*, Handl. Bds., Vol. I., p. 250 (1899).

Astur clarus, Sharpe, Hist. Coll. Brit. Mus., p. 112 (1906).

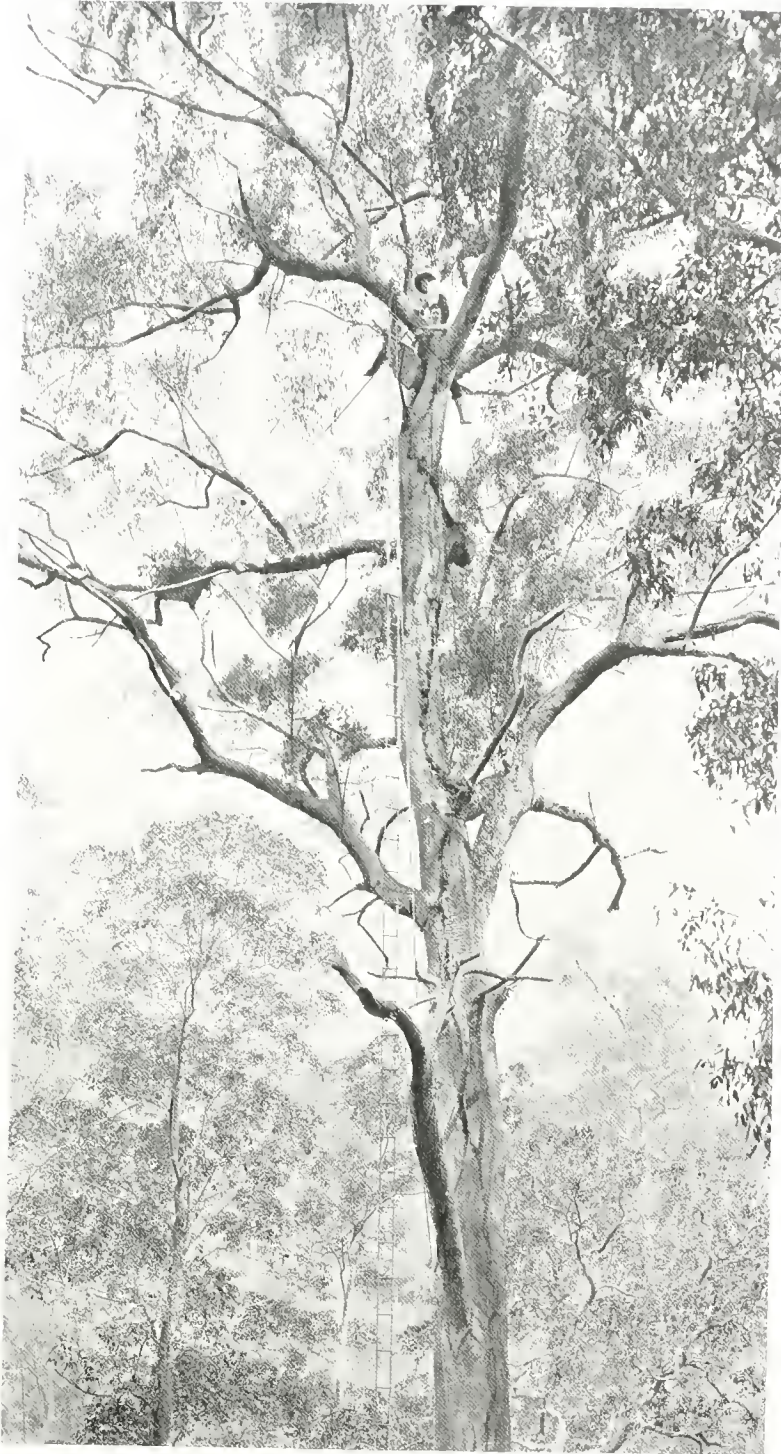
ADULT MALE.—*General colour above bluish-ash colour, bases of the feathers of the head and hind neck pure white; back and wings ashy-grey, basal portion of the inner webs of the quills white, the apical half of the primaries having a brownish wash; tail-feathers ashy grey, the basal portion of the inner webs of all but the central pair with whitish margins and having the remains of dark brown cross-bars; lores and feathers around the eye whitish; bases of the ear-coverts whitish, passing into light ash colour at the tips; all the under surface white, the under wing-coverts and under tail-coverts having the remains of narrow ashy cross-bars on the breast, which are more distinct on the sides; cere rich chrome-yellow, bill black, legs and feet rich chrome-yellow; iris reddish-brown. Total length in the flesh 16.5 inches, wing 10.2 tail 7.7, bill 1.1, tarsus 2.6.*

ADULT FEMALE.—*Similar in plumage to the male, but larger. Total length in the flesh 20 inches, wing 12.1, tail 9.75, bill 1.3, tarsus 3.*

Distribution.—Queensland, New South Wales, Victoria.

THE range of the Grey-backed Goshawk, the well-known *Astur cinereus* of most authors, extends from Cape York in Northern Queensland to Victoria; its stronghold, however, is the south-eastern portion of the former State, and North-eastern New South Wales. At one time it was common around Sydney, and specimens are still occasionally received from the suburbs by the Trustees of the Australian Museum, but not so frequently as in former years. It also occurs in the southern coastal districts, but it is much rarer as one reaches the southern border of the State, its range extending to the heavily timbered districts of Southern Victoria. Of the specimens in the Australian Museum Collection, the late Mr. J. A. Thorpe procured immature examples at Cape York, Queensland, as did Mr. K. Broadbent at Cairns, Mr. J. Rainbird procured adults at Port Denison, and Mr. George Masters at Gayndah, Pine Mountain and Wide Bay. There is a specimen obtained at Sydney, an adult male presented by Mr. Thos. Lewis, procured at Woolloomooloo, adjoining Sydney, another obtained by Mr. H. Carpenter at Hunter's Hill, and a young male procured by Mr. John Ramsay at Dobroyde, near Ashfield. From the Illawarra District the late Mr. J. A. Thorpe and Mr. J. Yardley procured specimens at Cambewarra, and Mr. Robt. Grant an adult female from the Kangaroo Valley. For many years past, at various times, Mr. George Savidge has procured the nests and eggs of this species in the scrubs of the Upper Clarence District, and has also sent me a skin for examination. Apparently with age *Astur clarus* loses the ashy cross-bars on the under surface, for both in adult and probably very old males and females now before me, they are almost obsolete in some specimens, although as a rule they are always slightly more pronounced on the female. The wing-measurement of adult males varies from 10 to 10.3 inches, and that of adult females from 12.1 to 12.6 inches.

This bird is essentially an inhabitant of the coastal districts, the contiguous scrubs and heavily timbered mountain ranges, but is sometimes found in open forest lands. Stomachs of



SCOOPING THE EGGS FROM A GREY-BACKED GOSHAWK'S NEST.

specimens examined contained the remains of small birds and mammals, also lizards and various kinds of insects.


Mr. George Savidge, a keen observer and resident of the Upper Clarence District, North-eastern New South Wales, and who has paid particular attention to the nidification of the Accipitres in that part of the State, has kindly favoured me with the following notes:—"*Astur cinereus* is fairly plentifully dispersed in the thick scrub lands in the Upper Clarence River District, and its call is very much like that of the 'King Parrot.' The nest is a large structure for the size of the bird, it being added to year after year if not molested. I have seen a nest as large as a new one of the Wedge-tailed Eagle. It is often placed on the large outstanding branches of the fig trees, and the slippery-barked box is also another favourite tree; one nest found in a Bean-tree contained young birds. I have taken eggs on several occasions, and have never found more than two in a nest; on one or two occasions I have found only one egg for a sitting. The

and grey. These birds commence to lay in August, and I have found them in September and October.

"The nest photographed was found on the 22nd September, 1907, in a small scrub at the head of a gully running into Wombat Creek, near Copmanhurst. The nest, which contained two eggs, was placed on a horizontal branch of a very large Tallow-wood tree, my rope ladder, about one hundred feet long, just reaching the fork from the ground. The tree containing the nest was at the bottom of a very steep rocky gully, and I placed my camera on a large rock, which brought me on a level of about thirty feet or more up the tree; the parent birds do not go away while being robbed, but fly about from tree to tree. On this occasion the bird came and sat upon the nest while we were packing away the ladder; how long they sit upon the nest when the eggs are gone, I do not know. Mr. E. H. Lane and my son visited this nest in 1905, when it contained young. It has been used, to my knowledge, every season for many years."

Mr. H. R. Elvery, of Alstonville, Richmond River, New South Wales, writes me:—"My experience in nesting operations with any species of the Order Accipitres, in the scrubs of the Richmond River District, has been on an extremely limited scale, as most species appear to avoid the dense scrub and resort to the more open forest country for the purpose of breeding. I have, however, observed a few nests of *Astur cinereus* at different times, but always placed at such inaccessible heights that it was impossible to reach them without the aid of a rope ladder. In the year 1906 a nest was reached, and the eggs taken for me, in rather a novel manner by a person engaged in felling the scrub in which the nest was located. In scrub felling most of the trees are cut above the spurs at varying heights from the ground, and the work is done on a spring board, on which the axeman stands. At one end of the board an iron plate, shaped something like a horseshoe, is bolted on, having a vertical projection or cross-bar at the extreme end; a nick is cut in the tree to receive the end of the board, and the cross-bar on the iron plate grips the upper part of the cut with the weight of the axeman standing on the board. The nest referred to was placed high up in a Sycamore tree, and was reached by Mr. Arthur Clarke, who worked his way up the long straight barrel by using two spring boards, standing on one while he cut a notch in the tree higher up to receive the other, and repeating the operation until he reached the first limb, after which he climbed to the nest. He then lowered a fishing line, to which I attached a billy can, which was hauled up, the eggs, two in number, being placed therein, and again lowered. The date of taking was 26th September, 1906, but it was very disappointing to find that the eggs were almost hatched."

The eggs are two in number for a sitting, oval in form, of a uniform pale bluish-white, green on the inner surface of the shell, comparatively close-grained, smooth and lustreless; usually they are nest-stained with pale yellowish-brown smears, sometimes largely so, obscuring one side, in others they are small and assume the form of markings scattered over the surface of the shell. A set of two in Mr. George Savidge's collection, taken by him at Mount Camelback, Newbold Station, in the Upper Clarence District, on the 9th October, 1898, measures:—Length (A) 2×1.62 inches; (B) 2.04×1.57 inches. Another set of two taken by Mr. Savidge in the same locality on the 16th October, 1899, measures:—Length (A) 1.98×1.57 inches; (B) 1.95×1.53 inches.

Young birds are pale ashy-brown above, the white bases of the feathers showing here and there, but particularly on the lower portion of the hind-neck, where some of the feathers are entirely white, with the exception of one or two V-shaped pale ashy-brown cross-bars; wings and tail-feathers pale brown, with a slight greyish wash, the latter having brownish-white tips, with eight or more distinct dark brown cross-bars; crown of the head dull grey-brown; all the under surface dull white, with broad  shaped ashy-brown cross-bars on the breast. Wing of a young male 9.9 inches. From this stage of plumage on to maturity the upper parts become greyer and the dark-brown cross-bars are almost entirely obsolete; the last sign of immaturity is usually exhibited in the broader and darker ashy-brown bars on the breast.

September and the three following months constitute the usual breeding season.

Astur novæ-hollandiæ.

WHITE GOSHAWK.

Falco nova-hollandia, Gmel., Syst. Nat., tom. I., p. 264 (1788, ex. Lath).

Astur nova-hollandiæ (albino), Gould, Bds. Austr., fol. Vol. I., pl. 15 (1848); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 118 (1874); *id.*, Hand-l. Bds., Vol. I., p. 250 (1899).

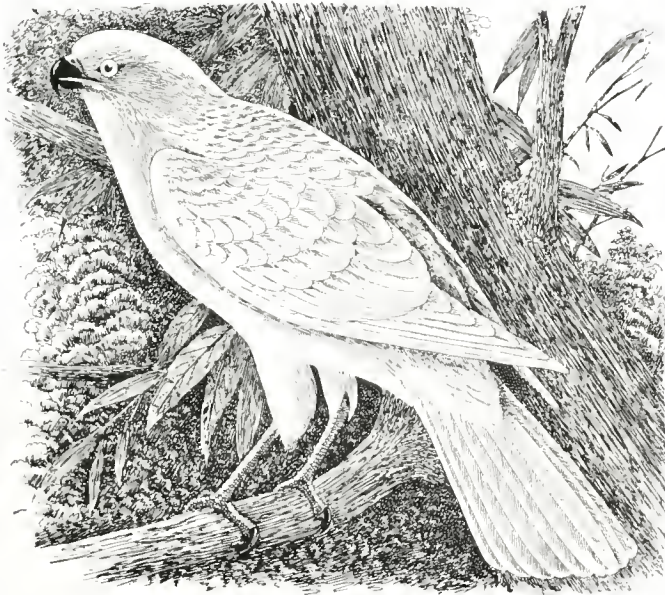
Leucospiza nova-hollandia, Gould, Handbk. Bds. Austr., Vol. I., p. 38 (1865).

ADULT MALE.—*The entire plumage pure white; bill black; cere and gape bright yellow; legs and feet yellow, claws black; iris carmine. Total length in the flesh 17 inches, wing 10.3, tail 9, bill 1.1, tarsus 2.8.*

ADULT FEMALE.—*Similar in plumage to the male, but larger. Total length in the flesh 20.5 inches, wing 12.2, tail 9.5, bill 1.4, tarsus 3.25.*

Distribution.—Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Tasmania.

THE White Goshawk inhabits the Northern Territory of South Australia, and all along the eastern side of the Australian continent from north to south, and likewise occurs in



WHITE GOSHAWK.

Tasmania. There is a fine series of specimens in the Australian Museum Collection; in Queensland they were obtained by the late Mr. J. A. Thorpe at Cape York, by Mr. E. A. C. Olive at Cooktown, by Messrs. E. J. Cairn and Robt. Grant, at Herberton and Cairns, and by Mr. J. Rainbird at Port Denison. In New South Wales, among others they were procured by Mr. James Yardley at the Tweed River, by Mr. E. Hamilton at Ballina, Richmond River, by Mr. J. Stair at Hornsby, by Major Shepherd at Bowral, Mr. B. G. E. Shaw at the Nepean River, Mr. Stevenson at Wellington, at New Angledool, in the north-western portion of the State, by Mr. A. S. Read, and by Mr.

George Masters in the Illawarra District, who also collected specimens at Hobart and Hamilton, in 1867, in Tasmania. In "Novitates Zoologicae" * Dr. Ernst Hartert records specimens from the Alligator, Gregory and Mary Rivers, in the Northern Territory of South Australia. It will therefore be seen that the range of the White Goshawk is far more extended than that of *Astur clarus*. It chiefly frequents the thickly timbered coastal districts, but also haunts forest lands, and occurs sparingly inland.

It is one of the useful members of the Accipitres, feeding largely upon insects; the contents of stomachs examined consisted principally of this kind of food. A young male shot at Bungonia, near Goulburn, New South Wales, had the stomach filled with the remains of locusts, dragon-

* Nov. Zool., Vol. XII., p. 207 (1905).

flies and *Phasma*, sp. On the labels of a male and female sent by Mr. E. A. C. Olive from Cooktown are marked "food, cockroaches, beetles, snakes." When driven by hunger, however, it does not hesitate to attack birds, and will even descend into a poultry-yard to secure its prey, one being killed at Hornsby, twenty-one miles from Sydney, having a chicken in its claws. Many birds are shot, owing to their conspicuous and striking pure white plumage rendering them an object of attraction, especially when placed with a background of deep umbrageous foliage.

Of a series of twenty specimens now before me three males, respectively from Cairns, Queensland, and the Tweed and Richmond Rivers, New South Wales, have the tail-feathers and the ends of some of the longer quills much worn and abraded, particularly in one specimen, of which little more remains than the shafts of the central pair of tail-feathers near their ends; otherwise all are in immaculate white plumage. A mounted bird obtained in New South Wales by Mr. E. S. Scarvell, has its general white plumage washed in a few places on the hind-neck, upper back and scapulars with brown; on the upper breast some of the feathers have darker brown central streaks, or irregular barrings, while the under surface of the tail-feathers are crossed with eight or more indistinct pale brown bars. It is the only specimen I have seen like it, and is probably the result of an *Astur clarus* paired with an *Astur nove-hollandiæ*, as referred to by Mr. Savidge in his notes.

From Copmanhurst, in the Upper Clarence District, New South Wales, Mr. George Savidge sends me the following notes:—"The White Goshawk (*Astur nove-hollandiæ*), is found sparingly dispersed in the reaches of the Upper Clarence River, but is nowhere common. The nesting site is some secluded scrubby gully or on the fringe of the larger scrubs; it usually selects the outspreading branches of a Box or Gum-tree for its nest, and can usually be plainly seen hovering above the thick scrubby undergrowth beneath. A pair built at the junction of Table Creek with the Clarence River, about four miles above Newbold Station Homestead, for many seasons, and I took the eggs from this pair of birds upon several occasions. The photograph of the nest I sent you belonged to the latter. It was a beautiful structure, the dead twigs and branches of which the nest was formed was covered with lichen and moss. We carried it on our backs to Newbold Station, and from there home in our sulky, a difficult task for such a structure. The eggs are two in number for a sitting. I have never found more, and like those of *Astur cinereus* they are devoid of any markings; when fresh laid they are greenish-white, but soon become dirty brownish when nest stained. The eggs of *Astur cinereus* and *A. nove-hollandiæ* are alike, the latter being a trifle smaller, but not always. Upon one occasion at Cangai we found a white bird and a grey backed one paired together; I have their eggs in my cabinet. All the young ones examined by me at Cangai, Camel-back, and Newbold Station in November, 1897, were pure white. From each of these same nests, after being relined, a pair of eggs were taken the following season."

Mr. Savidge sent me the following note under date 11th October, 1898:—"Since last writing you I have taken the eggs of *Astur nove-hollandiæ*. I found the nest last year in November containing one young bird; the nest is a very large structure, and was placed in a scrub Box-tree, in a belt of scrub, the bird flew off before we got near the nest; it contained two eggs very slightly incubated."

The late Mr. K. H. Bennett, writing me from Yandembah Station on the 30th October, 1890, remarked:—"In the dense scrubs which clothed the banks of Morwell River, in Gippsland, Victoria, in my boyhood's days, White Goshawks could be frequently met with, and on many occasions when Lyre-bird hunting in those scrubs I have come across a pair of white birds, and shot them both. On one occasion I found a nest placed in the topmost branches of a tall Gum tree. I saw this nest several times during its occupation, and I always saw either one or two white birds there."

Mr. Malcolm Harrison writes me as follows from Hobart, Tasmania:—"The White Goshawk (*Astur nova-hollandia*) occasionally puts in an appearance here, and its conspicuous plumage of course makes it an object of pursuit to the gunner. It has, therefore, little chance of breeding. Some few years ago, however, Mr. A. E. Brent obtained several sets of eggs in the neighbourhood of Mount Faulkner, and a set now in my cabinet was taken in the same locality. These eggs are longer in proportion than those of *A. approximans*, and the colouring is not so decided."

For the photograph from which the accompanying block of the nest and eggs of the White Goshawk is reproduced, I am indebted to Mr. George Savidge, who writes:—"The nest and two eggs of *Astur nova-hollandia* were found on the 21st September, 1901. The nest was placed in a tree on the edge of a scrub that runs into the Clarence River, just below the Washpool Crossing,

about four miles above Newbold Station."



NEST AND EGGS OF WHITE GOSHAWK.

The eggs of *Astur nova-hollandia* are indistinguishable from those of *A. clarus*, except that they are more rounded-oval in form and slightly rough-shelled, of a uniform pale bluish-white; green on the inner surface of the shell. Of a set of two in Mr. George Savidge's collection, one has

a few faint stainings of pale yellow, the other being smeared more or less with the same colour over the surface of the shell. They measure as follow:—Length (A) 1.95 × 1.55 inches; (B) 1.81 × 1.57 inches. Another set of two taken by him at Cangai, in the Upper Clarence District, on the 27th October, 1898, are of a uniform pale bluish-white, entirely free from stains, and measure:—Length (A) 0.89 × 1.58 inches; (B) 0.9 × 1.55 inches.

September and the three following months constitute the usual breeding season in New South Wales.

Astur leucosomus, Sharpe, inhabiting New Guinea and the adjacent islands, does not occur in Australia, and was admitted into its Avifauna on too slender grounds. I have never seen the specimen obtained in Torres Strait, and referred to by Dr. E. P. Ramsay† in the "Proceedings of the Linnean Society of New South Wales," as belonging to this species. Neither can I find in the

† Cat. Bds Brit. Mus., Vol. I., p. 119 (1874). † Proc. Linn. Soc. N. S. Wales, Vol. III., p. 248 (1870).

Australian Museum Collection any adult specimen of White Goshawk from Cape York agreeing in size with the much smaller dimensions of *A. leucosomus* from New Guinea. A young male *A. nova-hollandiæ*, from Cape York, measures total length 15 inches, wing 9·5, tail 7·4, bill 1·2, tarsus 2·6. An adult female in the Macleay Museum at the University of Sydney, from the same locality, shot by the Curator, Mr. George Masters, on the 18th September, 1875, measures:—Total length 19·5, wing 11·5, tail 8·8. This is only 0·7 inches smaller in wing-measurement than our largest specimen obtained in New South Wales. The smallest adult male we have in the collection was procured at Cairns, North-eastern Queensland, and has the tail-feathers and some of the quills much worn at the tips: it measures:—Total length 14·8 inches, wing 9·5, tail 7·6. Dr. Sharpe's measurements of the type specimen of *A. leucosomus* (an adult male) are as follows:—Total length 12·3 inches, wing 7·8, tail 5·9, tarsus 2·25, middle toe 1·2.

Astur approximans.

AUSTRALIAN GOSHAWK.

Astur approximans, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 181 (1827); Gould, Bds. Austr., fol. Vol. I., pl. 17 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 41 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 126 (1847); *id.*, Handl. Bds., Vol. I., p. 25 (1889).

Astur fasciatus, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 181 (1827)

ADULT MALE.—General colour above, including the wings, dull brown; a broad collar on the hind-neck rufous-brown; tail brown crossed with indistinct darker brown bands; head dark leaden brown; lores dull whitish, ear-coverts ashy-brown; throat whitish with pale ashy-brown cross-bars; remainder of the under surface dull rufous crossed with numerous white barings, which is narrowly bordered above and below with ashy-brown; the thighs more reddish-rufous, the white barings narrower, less distinct, and without the ashy-brown margins; bill black, bluish-horn colour at the base; cere and gape greenish-yellow; legs yellow, the feet slightly darker; iris rich yellow. Total length in the flesh 16·5 inches, wing 10 2, tail 8·3, bill 1, tarsus 3 1.

ADULT FEMALE.—Similar in plumage to the male, but larger. Total length in the flesh 19·3 inches, wing 11 2, tail 10, bill 1 2, tarsus 3·25.

Distribution.—North-western Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Tasmania.

WITHOUT exception the common Goshawk is the most widely distributed member of the Order Accipitres inhabiting the Australian continent, occurring also in Tasmania. In the Australian Museum Collection are examples from all parts of Australia, but in a series of sixty-six specimens now before me, only eighteen are skins of fully adult birds, the remainder consisting in about equal numbers of young and semi-adults, which vary so much in colour and character of their markings from the adults. This marked difference in plumage between the adults and young also occurs in *Accipiter cirrhocephalus*, which furthermore closely resembles *Astur approximans* in colouring and markings, but is of smaller size. As pointed out by Dr. R. B. Sharpe in 1874:—"The male of *Astur approximans* may always be told from the female of *Accipiter cirrhocephalus* by its long tail, which measures 8 to 8·5 inches in the former, whereas the length of the latter never exceeds 7·2 or 7·3 inches. Along with this character will be found the slender middle toe of Accipiter." In a species so widely distributed as *Astur approximans*, it may be expected that individual variations occur, while it is possible also with examples procured in the same State; our lightest and darkest adult specimens were obtained in New South Wales. In both adult males and females, but particularly the latter, otherwise fully

* Cat. Bds. Brit. Mus., Vol. I., p. 127 (1874).

plumaged specimens may be found without the rufous or light rusty-brown collar on the hind-neck, or only a slight indication of it at the sides; in some the head is of a lead-brown hue.

In "Novitates Zoologicae" Dr. E. Hartert refers to this species under the name of *Astur fasciatus*. As this name appears on the same page of the same volume, and is given by the same authors, and there is no question of priority of date of publication, I prefer to use the better known name of *Astur approximans*.

Of the large number of these birds received as donations by the Trustees of the Australian Museum, from different parts of New South Wales, but particularly from the vicinity of Sydney, the greater number have been shot while raiding poultry yards, pilfering chickens which have the run of the bush, or chasing pigeons. Stomachs examined have contained more or less perfect chickens, small birds, lizards, locusts and various kinds of other insects. This liking for chickens and pigeons is confirmed by my correspondent's notes. But that it does not confine itself to chickens will be seen from the following note received from Mr. J. A. Boyd, while resident at Ripple Creek, Herbert River, North-eastern Queensland, who wrote me as follows under date of 23rd June, 1897:—"A young *Astur approximans* attacked and almost killed a full grown Leghorn fowl here last Wednesday; the hen is not able to walk yet, and the Goshawk never will again."

Mr. H. G. Barnard writes me from Bimbi, Duaringa, Queensland:—"The following are the descriptions and measurements of three nests of *Astur approximans* taken in 1908. The first was taken in a Bloodwood tree (*Eucalyptus corymbosa*); the nest was composed of small dead sticks and green twigs, measurement across top seventeen inches, depth eight inches, egg cavity eight inches across by three inches deep, and lined thickly with leaves; height from ground sixty-five feet; the nest contained three eggs. The second was built in a large Moreton Bay Ash (*Eucalyptus tessellaris*), and was composed entirely of small dead sticks and green twigs, measurement across top two feet, depth one foot, egg cavity eight inches by three inches deep; height from ground fifty feet; the clutch numbered three eggs. The third nest was built in a Swamp Gum, and was an old nest of the White-fronted Heron slightly enlarged and lined with leaves, measurement across top fourteen inches by five inches deep, egg cavity seven inches across by two inches deep; it was fifty-four feet from the ground, and contained three eggs. The set of eggs forwarded was taken in a Blue Gum, fifty feet from the ground. This nest was on an out limb, and the eggs could only be reached by tying a spoon on the end of a ten-foot stick, so I could not measure the nest. It was built by the Goshawks themselves, a rather unusual thing, as they almost always reline and take possession of an old nest. The usual number of eggs in a set is three, sometimes four. The breeding season is from September to December. The food of this Goshawk consists of small birds and lizards, also grasshoppers; the male bird brings the female food while she is sitting, but does not assist in the duties of incubation."

From Copmanhurst, on the Upper Clarence River, New South Wales, Mr. George Savidge writes me:—"The Australian Goshawk (*Astur approximans*) is the commonest species of the Order Accipitres inhabiting the upper portions of the Clarence River District. It is a very destructive bird amongst the outback settlers, preying upon young chickens, &c., whenever it gets the chance, hence a large number are shot every year. A fairly strong pigeon can nearly always elude capture from this bird; it has nothing of the bold dash of the Black-cheeked Falcon. From my observations it appears to obtain most of its food by pouncing upon young birds, &c., and by stealing a march upon them about dusk. I have observed it several times chasing birds just before dusk, when they were going to roost. The nest is placed in a large Eucalyptus, and a stiff climb is usually necessary before it is reached. The eggs are generally

three in number for a sitting, although I have frequently found only two, and once or twice four. *Astur approximans* sometimes breeds in the same nest year after year. I took two young ones in December, 1894, and the next year in November I took three eggs out of the same nest, which are now in my possession. I was told by a selector these birds have bred in this tree for a number of years."

Mr. H. L. White writes me from Belltrees, Scone, New South Wales:—"The Goshawk (*Astur approximans*) gives a lot of trouble in the poultry yards during the summer months. I sometimes shoot one a day for some weeks. If left to itself each Goshawk takes a chicken or pigeon every day. It is an interesting sight to watch a Goshawk after a flock of pigeons, the aim of the first named being to get above its prey; having done so, after much manoeuvring, a sudden dart downwards, a quick blow, and a dead pigeon is the result. Some years ago numbers of pigeons were raised in this locality for the Sydney Gun Club, but owing principally to the ravages of *Astur approximans*, the industry was abandoned. I have seen a Goshawk caught in a wire fowl coop, into which it had dashed after a chicken. Nests are fairly numerous, and are usually built well away from settlement. I have known the bird to lay a second time in the same nest, after being robbed of the first clutch."

The late Mr. K. H. Bennett, of Yandambah Station, near Booligal, New South Wales, wrote me:—" *Astur approximans* is rarely met with on the plains, but is common in densely timbered districts. In habits it is rather inactive, capturing its prey, which consists chiefly of various birds and their young, more by stealth than by chase. I have on several occasions observed this species in the dusk of evening actually engaged in the capture of large Coleoptera, and the crop of one I shot was full of beetles. I have frequently found the nests of these birds, which are formed of sticks and lined with Eucalyptus leaves, the eggs being two or three in number for a sitting. A nest I found on the 6th December, near the Darling River, contained two young ones about a fortnight old; also the remains of a young rabbit about the size of a rat."

Mr. Thos. P. Austin writes me from Cobborah Station, Cobborah, New South Wales, under date 23rd April, 1911:—"During my eleven years residence here I have looked upon *Astur fasciatus* as comparatively rare, but during the last month I have shot about a dozen near my house. I have a large wire netting Sparrow trap, which during the last few weeks has always had a few Sparrows in it; these appear to attract the Goshawks, because many times I have seen them perched on top of the trap trying to catch a Sparrow, and this trap is placed only about twenty feet from the house. To show how daring these birds are, one came and perched on the railing of my verandah, only six feet from where my bookkeeper was sitting, and sat there for quite half a minute; another day one of them flew in at one end of the verandah, and passed within three feet of two people, and out at the other end. They do not appear to be fast enough to catch any well bred Pigeons, and the latter seem to know it and have little fear of them, but the Pigeons make for home very quickly when a Falcon appears."

Dr. W. Macgillivray sends me the following notes from Broken Hill, in South-western New South Wales:—" *Astur fasciatus* is the only Goshawk that I have seen in the district. It is universally distributed along the creeks which traverse the open plains, or find their way through the rocky hills of the Barrier Range, and also in the Mulga Scrubs. In seasons when food is scarce afield, it will come into Broken Hill, and has been repeatedly known to kill tame birds in private gardens, and to take Canaries out of their cages under a verandah. A bird of this species killed several Silver Gulls (*Larus nova-hollandicæ*) which were kept as pets at liberty in a garden. This Goshawk is dreaded by all smaller birds, and unlike the Falcons, which kill in the air, and from whom a bird in a bush or thicket is safe, the Goshawk will pursue a bird through the thickest bush or scrub with lightning-like rapidity, and often take young birds from the nest. The nest is built usually low down in a tree, situated in the more thickly timbered

and sheltered parts of the creeks or a Box clump in the scrub country, either in an upright or horizontal fork. The nest, constructed externally of sticks and lined with green leaves, is small and platform-like when seen from below, and easily recognised. Nesting commences early in September, eggs being usually found about the middle or end of the month; three is the usual clutch, four occasionally, and often only two. The bird is wary, and flushes from the nest on anyone coming within sight or hearing, slipping off through the timber with a gliding flight which would, perhaps, escape notice but for the cries of alarm set up by all the small birds in the neighbourhood."

Mr. Tom Carter writes as follows from Broome Hill, South-western Australia:—" *Astur approximans* is fairly common about Point Cloates, North-western Australia, and also about Broome Hill. In the north-west they haunt the water holes a good deal, and hide in the bushes and trees in order to dart out and seize the smaller birds that come to drink."

From Hobart, Tasmania, Mr. Malcolm Harrison writes me as follows:—"The Goshawk (*Astur approximans*) is plentiful about Hobart, and nests freely, mostly choosing high trees on



NEST AND EGGS OF THE AUSTRALIAN GOSHAWK.

the sides of deep gullies. I have noticed that the eggs obtained in the Midland Districts are, in common with those of most of the other Accipitres, much more strongly marked than is usual here. Probably the quality of food may account for this. A set of three eggs in my collection, taken near Ross, in the Midlands, has all the appearance of

having been artificially coloured by dabbing on the dark colour with the finger tips."

For the photograph from which the accompanying block is reproduced I am indebted to Mr. George Savidge, of the Upper Clarence River, who writes me:—"The nest and three eggs of *Astur approximans* were taken in September 1901. The nest was placed in an old Spotted Gum tree, about fifty feet from the ground, on the side of Stony Pinch, near Copmanhurst."

The nest is a large structure consisting of a deep platform of sticks and twigs lined in a depression in the centre with Eucalyptus leaves, and placed usually in a lofty tree, generally a *Eucalyptus* or *Casuarina*, and from forty to sixty feet from the ground.

The eggs are usually three, sometimes only two, and occasionally four in number for a sitting, varying considerably in size and colour. They are oval or rounded-oval in form, comparatively close-grained and smooth-shelled, dull, and lustreless, or with a very slight gloss.

of a uniform pale bluish-white ground colour, which in some specimens may be more or less obscured with pale yellowish-brown nest stains; others are sparingly marked with minute dark reddish-brown dots or hair lines, or spotted and blotched with different shades of reddish or purplish-brown, the latter colour being more often found in the sub-surface markings. They may be sparingly distributed over the shell, at either end, or around the middle, but nowhere have they a tendency to assume the form of a zone. The extremes of size are shown in two sets taken by Mr. H. G. Barnard, at Binbi, Duaringa, Queensland, during the same month in 1908. A set of four taken on the 11th October measures:—Length (A) 1.73 × 1.39 inches; (B) 1.64 × 1.33 inches; (C) 1.68 × 1.38 inches; (D) 1.69 × 1.35 inches. A set of three taken on the 30th October measures:—Length (A) 2.02 × 1.47 inches; (B) 1.97 × 1.51 inches; (C) 1.97 × 1.5 inches. Another set of four taken by Mr. Barnard on the 4th October, 1906, measures:—Length (A) 1.75 × 1.4 inches; (B) 1.8 × 1.45 inches; (C) 1.72 × 1.41 inches; (D) 1.73 × 1.43 inches. A set of two taken by Mr. C. Ernest Cowle, at Ilamurta, Central Australia, on the 10th September, 1895, measures: Length (A) 1.8 × 0.51 inches; (B) 1.87 × 1.47 inches.

When about a fortnight old the young are covered everywhere, except the lower flanks, with creamy-white down, pin feathers first showing through the down of the wings. Iris brown. When slightly older the primaries have burst their sheaths at the tips, disclosing brown-rufous tipped feathers.

Young birds are brown above, all the feathers being narrowly margined with rufous; quills brown, the secondaries edged with pale brown at the tips, basal half of the feathers of the head and hind-neck white; ear-coverts dark brown, their bases whitish; all the under surface white, with dark brownish streaks to the feathers of the throat, and which are very much wider on the upper breast; those on the lower breast and abdomen crossed with three or more broad pale brown bands; the thighs washed with fulvous. In this stage of plumage the wing-measurement of both males and females equals that of the adults.

Semi-adult birds of both sexes are distinguished by the broader rufous, and white cross-bands on the under surface.

September until the end of January constitutes the usual breeding season of this species in Eastern Australia.

A closely allied species, *Astur cruentus*, is found in North-western Australia and the Northern Territory of South Australia, distinguished principally by its smaller size. None of our Australian Accipitres have puzzled Ornithologists so much as the present species. Gould, who described and figured it under the name of *Astur cruentus*, states in his "Birds of Australia" that it is very common in Western Australia, particularly in the York District and at the Murray. Whether he was quoting from Gilbert's notes, or whether the statement was only a surmise on Gould's part it is impossible to say, but the fact remains that this species is undoubtedly the rarest of all our Australian diurnal birds of prey. Mr. George Masters did not meet with it on either of his collecting trips to Western Australia in 1863 and 1868, the specimens he procured were *Astur approximans*, similar to all others examined by me from the south-western portions of that State; some of them were sent under the name of *Astur cruentus*. Mr. E. J. Cairn and the late Mr. T. H. Bowyer-Bower, spent over twelve months at Derby, North-western Australia, and although both obtained several specimens of *Astur approximans*, it was only a short time before the decease of the latter gentleman that he was enabled to send a box to Dr. E. P. Ramsay for examination, which contained examples of the true *Astur cruentus* of Gould. I know of no properly authenticated eggs of this species: that is with the parent bird shot and procured at the nest.

Genus ACCIPITER, *Brissou.***Accipiter cirrhocephalus.**

COLLARED SPARROW-HAWK

Sparvus cirrhocephalus, Vieill., Nouv. Diet. d'Hist. Nat., Tom. X., p. 329 (1817).

Accipiter torquatus, Gould, Bds. Austr., fol. Vol. 1, pl. 19 (1848); *id.*, Handbk. Bds. Austr., Vol. 1, p. 45 (1865).

Accipiter cirrhocephalus, Sharpe, Cat. Bds. Brit. Mus., Vol. 1, p. 141 (1874); *id.*, Hand-l. Bds., Vol. 1, p. 253 (1889).

ADULT MALE.—*General colour above bluish-ash colour, slightly darker on the wings, the inner webs of the quills barred with dark brown, the head shaded with grey; collar on the hind neck vinous-red, less distinct on the centre; tail-feathers brownish-grey above crossed with dark brown bands, their under surface pale ashy-grey, rendering the darker cross-bands more distinct; sides of the head and ear-coverts of a clearer ashy-grey; throat dull white, mottled with ashy-grey; remainder of the under surface narrowly barred with dull white and vinous-red, the breast with an ashy wash, the bars on the under tail-coverts wider apart, broken and almost obsolete in some specimens; bill black, lower portion of base of upper mandible bluish-lavender colour; cere greenish-yellow; legs pale ochreous-yellow, the feet slightly darker; iris orange-yellow. Total length in the flesh 13 inches, wing 8.2, tail 6.2, bill 0.65, tarsus 2.25.*

ADULT FEMALE.—*Similar in plumage to the male but larger, and having as a rule the pale vinous-red cross-bars on the under tail-coverts more pronounced. Total length in the flesh 14.5 inches, wing 9.3, tail 7, bill 0.75, tarsus 2.5.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Tasmania.

IN several respects the Collared Sparrow Hawk closely resembles the common Goshawk, *Astur approximans*. Like that species it is generally distributed in favourable situations over the Australian continent and Tasmania. Although much smaller it is very similar to it in plumage, undergoing the same changes from youth to full adult livery, and its eggs, which may be either a uniform pale bluish-white, or blotched and smeared with brown, are distinguishable from those of *Astur approximans* only by their smaller size. There are numerous specimens in the Australian Museum Collection from different parts of Australia and Tasmania, among others Mr. George Masters procuring specimens at King George's Sound, Western Australia, in April, 1866, and October, 1868; also at Port Lincoln, South Australia, and Gayndah, Burnett River, Queensland, in September, 1870. Specimens are sometimes obtained in the neighbourhood of Sydney, but not so often as *Astur approximans*, Mr. W. J. Cosgrove procuring an adult female at Elizabeth Bay, the late Mr. H. Newcombe a young female at Randwick; farther afield Mr. J. Stein a young female at Smithfield, and Mr. A. M. N. Rose an adult male at Campbelltown, the latter bird being shot while pursuing a *Grallina picata*.

It frequents open forest and heath lands, also stony wastes near the coast and thickly timbered mountainous districts. Mr. A. M. N. Rose sending specimens from Boloco Station, near Buckley's Crossing, Snowy River, two thousand feet above the level of the sea, and in the neighbourhood of the coldest part of Australia, and Mr. Robt. Grant from Lithgow, on the Blue Mountains, New South Wales, lying at an altitude of three thousand nine hundred feet above the sea level. It is a remarkably bold and audacious species, and while on the wing in pursuit of its quarry its swoop resembles the flight of an arrow from a bow. I once saw one mobbed by a flock of Swallows (*Hirundo neovena*) while leisurely pursuing its way, and apparently

intent only on eluding its pursuers; this continued for some distance, the Swallows becoming bolder, coming nearer, and darting at the Sparrow-Hawk. Like a lightning-flash the latter suddenly turned and seized one of the Swallows, the remainder of the flocks screaming and scattering in all directions. Although living chiefly on the smaller species of birds, it does not hesitate to attack those of larger size, as shown by Messrs. Vigors and Horsfield in the "Transactions of the Linnean Society of London," who quote a note:—"Mr. Caley says: I once witnessed it in the act of darting at a Blue Mountain Parrot, which was suspended in a cage from the bough of a Mulberry tree, within a couple of yards of my door." Caley resided at Parramatta, where he made a collection of birds in the early days of the settlement of New South Wales. Mr. G. A. Keartland, while in camp at the junction of the Fitzroy and Margaret Rivers, in North-western Australia in 1897, also saw an *Accipiter cirrhocephalus* attacking a pair of Rose-breasted Cockatoos (*Cacatua roseicapilla*) while the latter were engaged in preparing a nesting-place.

From Coomboolaroo, Duaringa, Queensland, Mr. H. G. Barnard sent me the following note:—" *Accipiter cirrhocephalus* always builds a new nest composed of small green twigs, which are allowed to wither before the eggs are laid, usually three or four in number for a sitting. This is one of the few species of Accipitres that will venture to attack one attempting to rob its nest. Its usual food is small birds."

From Copmanhurst, Upper Clarence River, New South Wales, Mr. George Savidge sends me the following notes:—"The Collared Sparrow Hawk (*Accipiter cirrhocephalus*) is fairly common throughout the Clarence River District, and is a much smarter bird than the Goshawk (*Astur approximans*), and it is not such a troublesome bird to the settlers as the latter. A pair nested in a tree close to a farmer's place here for many years, using the same nest each season until it was blown down by a gale of wind. It was on a thin limb of a Bloodwood-tree, and out of reach of the most expert climbers; it removed and constructed its nest in an Apple-tree close by. I took the eggs from this nest in company with Mr. E. H. Lane, who has them in his collection. Although this bird had young for so many years in such close proximity to the fowls and chickens, it was never known to molest them in any way."

Mr. Robert Grant has handed me the following notes:—"The Collared Sparrow-Hawk is sparingly distributed over the Blue Mountains, New South Wales, and is generally met with in the valleys or flats. During flight it is remarkably quick in its movements, and is usually seen about six to eight feet from the ground gliding in and out of the trees, and it has often surprised me that it does not come in contact with them. It is very destructive to small birds, and I have seen one strike and secure a Yellow-breasted Robin (*Eopsaltria australis*) without apparently lessening its speed in any way. Of the many I have shot, the stomachs of nearly all of them contained the remains of small birds."

From Orange, New South Wales, Mr. E. H. Lane writes me:—"I took many nests of *Accipiter cirrhocephalus* about forty-five to fifty years ago, and found the eggs to vary very much, some clutches being more oval in shape, larger, and the blotches more bleary, and appearing as if beneath the surface of the shell, while other sets were rather smaller, more pointed at one end, and the blotches much plainer, as if they could be easily rubbed off. The difference would lead one to think they could not belong to the same species. During these last forty years I have robbed very few of these nests, and strange to say all the eggs have been much more of the latter type I have described. In a very large majority of cases the sets have been three, only an odd instance of two."

Mr. Tom Carter writes me from Broome Hill, South-western Australia:—" *Accipiter cirrhocephalus* is not a very common species either in the north-west or south-west according

* Trans. Linn. Soc., Vol. XV., p. 182 (1827)

to my experience, and was never noted on the coast at Point Clabes, but a nest with three eggs was taken on the Gascoyne River on the 23rd July, 1887. It was built about twenty feet from the ground, in a White Gum. At Broome Hill I saw one seize a *Glossopsittacus fulvirocephalus* from a flock of these birds. I shot it, and found the Lorikeet still alive in the Goshawks claws, and seemingly little hurt."

Dr. Lonsdale Holden writes me from Tasmania:—"I shot a Sparrow-Hawk (*Accipiter terquatus*) out of my bedroom window at Bellerive, on the 9th March, 1901, which was eyeing some chickens in my garden."

Mr. Malcolm Harrison writes me from Hobart, Tasmania:—"Although the Sparrow-Hawk (*Accipiter cirrhocephalus*) is so comparatively common, its eggs are difficult to obtain, and I know of very few sets obtained locally. Those I have seen are well coloured. Personally I have not come across more than two or three nests, and those were practically inaccessible. When living at New Town, some years ago, I saw from my window a Sparrow-Hawk strike down a Sparrow and proceed to devour it on the old stump of an Apple-tree, within a yard of the verandah, and even when I appeared outside no fear was evinced, and the bird only took wing when I was within a few feet of it."

The nest, a nearly flat structure, formed of thin sticks, and lined with Eucalyptus leaves, is usually placed in the topmost branches of a lofty Eucalyptus or Casuarina, Mr. G. Savidge taking a set of four eggs from a nest a fortnight before my visit to him at Copmanhurst, on the Upper Clarence River, in October, 1898, at a height of one hundred and ten feet from the ground. The late Mr. K. H. Bennett noted that this species built a fresh nest every season at Yandebah Station, near Booligal, New South Wales, as also did Mr. H. G. Barnard, at Coomooboolaroo, Duaringa, Queensland. Contrary to this rule is Mr. Savidge's experience at Copmanhurst, where he observed the same nest, although probably re-lined, used for several years in succession.

The eggs are usually three, not infrequently four, and occasionally only two in number for a sitting, oval or rounded-oval in form, sometimes rather sharply pointed at one end, the shell being comparatively close-grained and smooth, some being lustreless, others with more or less gloss. They may be of a uniform pale bluish-white, finely and sparingly freckled with brown or yellowish-brown, or heavily blotched and smeared with the same hues; in some the colours approach a washed-out reddish-brown; rarely are there underlying markings. Frequently one egg of a set may be smeared or heavily blotched, and the remainder almost, or in some instances, entirely devoid of markings, although probably nest stained. A set of four taken by Mr. H. G. Barnard, at Coomooboolaroo, Duaringa, Queensland, on the 5th November, 1892, measures:—Length (A) 1.51 × 1.22 inches; (B) 1.54 × 1.27 inches; (C) 1.57 × 1.3 inches; (D) 1.49 × 1.21 inches. A set of four taken by Mr. George Savidge at Copmanhurst, Upper Clarence River, New South Wales, on the 23rd October, 1898, measures:—Length (A) 1.52 × 1.18 inches; (B) 1.49 × 1.22 inches; (C) 1.51 × 1.19 inches; (D) 1.46 × 1.22 inches. A set of four taken by Mr. H. G. Barnard, at Bimbi, Duaringa, Queensland, on the 18th October, 1908, measures:—Length (A) 1.52 × 1.2 inches; (B) 1.47 × 1.22 inches; (C) 1.51 × 1.22 inches; (D) 1.51 × 1.18 inches. Large eggs of this species resemble small eggs of *Astur approximans*.

Young birds are brown above, with narrow rufous margins to the feathers of the back, upper wing-coverts, scapulars, and the upper tail-coverts, the concealed portions of the scapulars and the margins of the feathers of the nape and hind-neck white; tail dull greyish-brown, irregularly edged with rufous, and barred with darker brown; ear-coverts brown, the cheeks and feathers above and behind the eye black narrowly-edged with white: all the under surface dull white, the feathers on the throat and upper breast broadly streaked with dark wood-brown, those on the flanks, lower breast, abdomen and under tail-coverts with ——— shaped wood-

brown cross-bars with a small dull rufous spot on the centre of most of them; thighs fulvous-white, with broad rufous and brown cross-bars. Wing-measurement of male 8·1 inches; of female 9·2 inches.

The usual breeding season in Eastern Australia is from the beginning of September until the end of December, nests with eggs being more common in October. In North-western Australia Mr. Tom Carter procured a nest with eggs in July.

Sub-family BUTEONINÆ.

Genus ERYTHROTRIORCHIS, Sharpe.

Erythrotriorchis radiatus.

RUFIOUS-BELLIED BUZZARD.

Falco radiatus, Lath., Ind. Orn., Suppl. II., p. XII. (1801).

Astor radiatus, Gould, Bds. Austr., fol. Vol. I., pl. 16 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 40 (1865).

Crospizias radiatus, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 159 (1874).

Erythrotriorchis radiatus, Sharpe, Proc. Zool. Soc., 1875, p. 337; *id.*, Handl. Bds., Vol. I., p. 254 (1899).

ADULT MALE.—General colour above bright rufous, the feathers of the head and nape with a longitudinal black streak, those of the back, scapulars, and rump with broad lanceolate blackish-brown centres; upper wing-coverts similar, but their margins of a brighter rufous; quills ashy-brown with darker brown cross-bars, the inner webs of the apical portion of the primaries darker, their outer webs washed with grey; tail-feathers ashy-brown, paler at the tips, with dark brown cross-bars; cheeks and throat pale rufous-buff, with blackish shaft streaks; remainder of the under surface bright rufous, each feather narrowly streaked with black down the centre; thighs and under tail-coverts uniform bright rufous, the shafts of some of the latter dark brown; bill dark horn colour; legs and feet pale yellow; iris rich yellow. Total length 20 inches, wing 14·3, tail 9·5, bill 1·1, tarsus 3.

ADULT FEMALE.—Similar in plumage to the male but larger. Total length 23 inches, wing 16·2, tail 10·75, bill 1·3, tarsus 3·3.

Distribution.—Northern Territory of South Australia, Queensland, New South Wales.

LATHAM originally described this species in his "Index Ornithologicus" under the name of *Falco radiatus*, which is founded on the Radiated Falcon of his "General Synopsis of Birds." The late Dr. R. B. Sharpe, in his "History of the Collections in the British Museum,"* referring to Watling's painting of this species under the name of "New Falcon," remarks:—"On this picture is founded the description of Latham's Radiated Falcon, and the figure given by him is adapted from Watling's picture. Thus the latter becomes the type. . . . Another painting of the Radiated Falcon has attached the following note by Watling:—'The skin of this bird I found nailed up to a settler's hut. It is the only one of its kind ever seen. The drawing is a faithful copy. The settler who shot it says the iris was brown, and remarked that he never saw any bird fly with such swiftness. Its claws, which were long, small and sharp, when he took it up it drove quite through the ends of his fingers. A new Falcon. This bird measures from the bill to the extremity of the tail twenty-four inches.' It will be seen that Latham copied the notes, but did not say who had written them."

* Hist. Coll. Brit. Mus., Bds., pp. 110-11 (1900).

As Watling executed these paintings in the newly formed settlement in Port Jackson between 1788 and 1792, where Sydney now stands, it may be gathered from the preceding notes that the type of the Rufous-bellied Buzzard was obtained in New South Wales, and also that like many other birds described by Latham his name stands as the authority for a species he had never seen.

Gould was doubtful of the position of the present species when discussing it in his folio edition of the "Birds of Australia," and remarks on the great length of the middle toe. Dr. R. B. Sharpe, in the "Proceedings of the Zoological Society of London," points out that in the "Catalogue of Birds in the British Museum" he made a mistake in referring it to the genus *Trospizias* of Kaup, and proposed the genus *Erythrotriorchis* for its reception.

With the exception of *Astur cruentus* the present species is the rarest of all our Australian Accipitres. In the "Catalogue of Birds in the British Museum," Dr. Sharpe enumerates specimens from Port Essington, in the Northern Territory of South Australia, presented by Captain Chambers, R.N.; another received from Gould, which was procured at Bourke, Darling River, New South Wales, and the type of *Haliastur caleyi*, described by Vigors and Horsfield in the "Transactions of the Linnean Society of London," and who quoted the following note of Caley's:—"It frequents the upper parts of the Harbour (Port Jackson), particularly about the flats, a few miles below Parramatta. The natives tell me it feeds upon dead fish, and the bones which they leave. The flats is a noted fishing place for the natives; the water there is shallow, and at ebb tide a great portion of sand is left bare, which, with some marshy land adjoining, forms a convenient resort for several species of birds." The specimens in the Australian Museum Collection were obtained at Cooktown and Cairns, North-eastern Queensland, at the Dawson River, and Wide Bay in the same State, and a male procured in the Richmond River District, New South Wales.

For a knowledge of the nidification and eggs of this species I am indebted to the late Mr. George Barnard and his son Mr. H. Greensill Barnard, of Coomoooolaroo, Duaringa, Queensland. In 1883 the late Mr. George Barnard forwarded the skins of this Buzzard to Dr. E. P. Ramsay, of the Australian Museum, for the purposes of identification, and in September of the following year sent him for description one of a set of two eggs taken that month from a large nest formed of sticks, and lined with Eucalyptus leaves, and built at a height of about thirty feet from the ground, in a Moreton Bay Ash (*Eucalyptus tessellaris*). Subsequently Mr. Barnard forwarded me the other egg of this set, and informed me that his son had obtained another nest on the 27th August, 1889, "built in a flat fork of a projecting limb of a Lemon-scented Gum (*Eucalyptus citriodora*), at least fifty feet from the ground, the eggs of which, two in number, have a decided bluish tinge." In a later letter Mr. Barnard wrote me:—"A rather singular occurrence took place about the Radiated Goshawk's nest; when my sons found it there were two eggs in it, and one of them shot the male; about a month after, being up that way again, one of them climbed the tree and found another egg in this nest, laid after the first eggs were taken and the male bird shot."

Mr. H. G. Barnard wrote me as follows from Coomoooolaroo, Duaringa, Queensland, under date 2nd March, 1893:—"I have only taken two nests of *Astur radiatus*. The first I found one day when out riding near a large swamp; my attention was attracted by hearing the loud cries of a White Cockatoo (*Cacatua galerita*). I rode over to the place, and when I arrived there the male *A. radiatus* flew off the ground, leaving the body of a freshly killed Cockatoo. On looking about I saw the nest in a large Moreton Bay Ash, and on hitting the tree the female flew off. Not knowing the species I did not go up, but rode up next day with my brother Charlie, when we shot both birds; I then went up the tree and obtained the eggs. The nest

* Proc. Zool. Soc., 1875, p.p. 337-9. † Cat Bds. Brit. Mus., Vol. I., p. 159 (1874).
; Cat. Bds. Brit. Mus., Vol. I., p. 160 (1874).

was about seventy feet from the ground, and was composed of dry sticks, interwoven with twigs slightly pressed down in the centre. The second nest was built in a Lemon-scented Gum, about fifty feet from the ground; this was a very hard climb, but when I reached the nest was rewarded with a pair of eggs; in the nest were also the hind legs and tail of a Frilled Lizard, the rest had evidently been eaten. One day near the lagoon at Coomooboolaroo, a flock of Wood Ducks (*Chenonetta jubata*) was feeding in the grass about thirty yards from me, when I saw an *Astur radiatus* approaching, and it was also observed by the Ducks, which at once made a dash for the water. Like a flash the bird of prey was among them, striking down and killing one before they reached the margin of the lagoon."

Subsequently Mr. Barnard wrote me that he had found another nest built in a Lemon-scented Gum, on the 3rd October, 1893, about seventy feet from the ground, which contained two recently hatched young. Writing me in March, 1907, Mr. Barnard remarks:—" *Astur radiatus* has entirely left this district; I have not seen one for many years."

The eggs are two in number for a sitting, almost globular in form, rather rough shelled, of a uniform dull bluish-white, or having irregular-shaped smears and blotches of different shades of brown scattered over the shell, which is lustreless. Of the original set taken one is smeared and blotched with brown; the other is devoid of markings. They measure:—Length (A) 2.2 × 1.83 inches; (B) 2.18 × 1.83 inches.

Immature birds resemble the adults, but have the feathers of the head and nape dark brown with indistinct dull white-brown margins, the feathers of the back dark brown narrowly edged with rufous; the throat dull white, mesially streaked with black; upper breast pale rufous with blackish central streaks; lower breast, abdomen and under tail-coverts white washed here and there with rufous, having a narrow black shaft streak and terminating near the end of each feather in a rufous spatulate spot. Wing of female 16 inches.

August until the end of November constitutes the breeding season of this species in Eastern Australia.

Sub-family AQUILINÆ.

Genus UROÆTUS, *Kaup.*

Uroætus audax.

WEDGE-TAILED EAGLE.

Falco audax, Lath., Ind. Orn., Suppl., p. 2 (1801).

Aquila fucosa, Gould, Bds. Austr., fol. Vol. I., pl. 1 (1848).

Aquila audax, Gould, Handbk. Bds. Austr., Vol. I., p. 8 (1865).

Uroætus audax, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 231 (1874); *id.*, Hand-l. Bds., Vol. II., p. 260 (1899).

ADULT MALE.—*General colour above dark brown, with small paler brown margins and tips to the feathers of the back, nape and hind neck light chestnut-brown, paler at the tips of the feathers: upper tail-coverts pale brown, passing into buffy-white at the tips of some of the longer feathers: upper wing-coverts dark brown, margined at their tips with pale brown, the lesser series having a tawny-brown shade at their tips; quills and tail-feathers black: all the under surface dark brown, some of the feathers on the fore-neck with small pale brown tips: under tail-coverts pale brownish-white: bill faint greyish-white, dull bluish-black at the tip: skin in front and around the eye bluish-*

white; base of the lower mandible and gape flesh colour, legs and feet dull whitish, claws black; iris light yellowish-brown. Total length in the flesh 38.5 inches, wing 24.5, tail 17.5, bill 2.7, tarsus 4.75.

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Tasmania.

THE Wedge-tailed Eagle, or more familiarly known "Eagle-hawk," is generally distributed in favourable situations over the greater portion of the Australian continent and Tasmania; it is, however, more abundant in some places than others, and more particularly in



WEDGE-TAILED EAGLE.

the inland portions of the States than it is near the coast, and where in some localities it may be entirely absent. It also frequents rocky mountain ranges, and one of the finest sights to an Ornithologist is to see a pair of these birds circling around on the wing, for they are often the only moving objects above a wilderness of trees and stones, and undoubtedly add to the grandeur and beauty of the landscape. This has appealed to me more forcibly in the neighbourhood of the mammoth Druidical rock-like remains of Stonehenge, in the New England District, New South Wales, but neither in mountain range nor amid crags and peaks is the Wedge-tailed Eagle more numerous than it is among the scattered timber of the inland wide-spreading plains.

Its natural food consists of various mammals and birds, chiefly wallabies, kangaroo-rats, young dingoes and kangaroos, native bears and opossums, pigeons, cockatoos, ducks and herons, also the larger species of lizards. Since the advent of white settlers in Australia, it has also turned its attention to their flocks and herds, and is more particularly destructive in the lambing season. In some districts it is worse than in others, the pastoralist seeing in these birds the most relentless enemies of his flocks, and kills and poisons them when

opportunities offer. On the other hand, where the introduced hares and rabbits are numerous, the Wedge-tailed Eagle preys to a large extent on them, and renders good service to the pastoralist. Mr. A. M. N. Rose wrote me from Boloco, New South Wales:—"Mr. W. Crisp, of Rock Flat, near Cooma, informs me that one day in November, 1900, he counted forty-two Eagles in one of his paddocks, and many people thought they ought not to be destroyed, for although they did harm in killing lambs, they did more good in killing hares and rabbits."

Wedge-tailed Eagles or "Eagle-hawks" are placed among the "Noxious Animals" in New South Wales. In the Official Report for the year, 1899, of the Stock and Brands Branch of the Department of Agriculture of New South Wales, it is stated that during that year the Pastures and Stock Protection Boards throughout the State paid bonuses on 7865 "Eagle-hawks" killed, Tamworth District heading the list with 1204 birds destroyed. In the Official Report of the same department for the year 1907, it is stated that bonuses were paid only on 835

“Eagle-hawks” throughout the entire State, Carcoar District heading the list with 342 birds destroyed. It must be with feelings of dismay, however, that a pastoralist compares these two Official Reports, for a greater and more deadly scourge than “Eagle-hawks,” rabbits or hares is rapidly spreading over the State; I refer to foxes, whose ravages are already well known. In 1899 bonuses were paid on 1527 foxes, destroyed in different parts of the entire State. Eight years later, in 1907, 30,779 foxes and cubs were destroyed, the Young District heading the list with 5349 of these animals. In the future, when all the ground game is cleared by these acclimatised curses, then more than ever will foxes turn their attention to the flocks of the pastoralist.

These birds are keen sighted and curious, and anything moving at once arrests their attention. The Revd. J. Milne Curran, who had just returned from Mount Kosciusko, in South-eastern New South Wales, and the highest peak in Australia, informed me he was much amused with a Wedge-tailed Eagle, which made repeated attacks at a dog he had with him. The greatest fun was caused, however, by rolling heavy boulders down the declivity, which the Eagle savagely attacked, and vainly made repeated attempts to stop with its outstretched talons. After witnessing this several times one of the party with a gun remained behind, laying flat on the ground: the Eagle then gradually came close to him, when he fired and shot it; the expanse of wing measuring six feet across. Eagles are fairly numerous in this district. Below the rocky side of Mount Kosciusko is a small but picturesque lake, known by the aboriginal name of Cootapatamba, “the lake where the Eagles drink.”

From Dr. R. B. Sharpe’s “History of the Collections of the British Museum,” it may be learnt that Latham, whose name obtains as the authority for this species, took his description from one of Watling’s drawings, made in the early days of settlement in New South Wales, and also appropriates his notes without making any reference to him. Although noted by several writers, more particularly during the early history of the State, as frequenting the neighbourhood of Sydney, it is very seldom, or never, that it occurs now, the last specimen received by the Trustees of the Australian Museum being a young bird shot by Mr. J. D. Partridge on the 1st June, 1886, at Lane Cove, about three miles from the city. It is more often met with, but is by no means common, about and beyond the mountainous outskirts of the County of Cumberland, notably in the rugged ranges of the Hawkesbury River and Upper Nepean District, a specimen being received from Mr. Michael Rafferty, of Colo Vale, on the 8th July, 1907.

There is a great variation in colour of adult birds, some of them being much paler in breeding plumage on the nape, hind-neck and upper wing-coverts, being of a light creamy-buff. Usually this is put down to youth, but such is not always the case, as may be seen by the quills and tail-feathers, many being found breeding before they assume the general blackish-brown plumage, and which is only the livery of very old birds. In Central Australia Mr. C. Ernest Cowle informs me both adults and young are much prized by the Aborigines on account of their feathers and down, and that these birds are occasionally killed either with boomerang or spear when gorged or gorging on offal or a dead kangaroo.

Mr. H. G. Barnard writes me from Bimbi, Duarina, Queensland:—“One nest of *Uroæetus audax* visited on the 2nd of June, 1907, contained two young a few days old; the nest was built in a large Swamp Gum, and was sixty feet from the ground; the hind quarters of a freshly killed opossum were placed on the side of the nest. I visited this nest previously on the 28th of May, 1906; it then contained one young just hatched, and an egg out of which the beak of a young bird protruded; also a dead Blue-tongued Lizard, a leg of an Opossum, and a young Bronze-wing Pigeon (*Phaps chalcoptera*), on which the pin feathers were just bursting; it had

* Hist. Coll. Bds. Brit. Mus., p. 109 (1906).

evidently been taken from a nest. Another nest, built in a large Bloodwood (*Eucalyptus corymbosa*) was visited on 12th June, 1907, and contained one fresh egg, which was taken as the climb was a hard one; on visiting this nest a few days later, a second egg was found and taken, showing that the bird had not completed the set on the first visit. This nest was fifty-eight feet from the ground, and had been used for a number of seasons. The following are the measurements of a Wedge-tailed Eagles nest, in which a pair of Brown Hawks (*Hieracidea orientalis*) laid:—"Across the top of the nest, diameter four feet, depth three feet, egg cavity one foot 6 inches by four inches deep, height from ground sixty feet."

Mr. George Savidge sends me the following notes from Copmanhurst, Upper Clarence River, New South Wales:—"The Wedge-tailed Eagle (*Uroætus audax*) is a scarce bird in the Clarence River District, which is probably due to the kangaroo shooters who poison parts of the carcasses of the kangaroos for the sake of obtaining dingo scalps, and I have seen several of these Eagles dead around them. Its large nest is usually placed very high in some tall Eucalyptus; the eggs are laid mostly during June and July. I have seen it on more than one occasion rushing through the tall timber, with wings half closed, after large wallabies, but have never witnessed the closing struggles between them; the Aborigines, however, tell me they kill and devour them. One day when Quail shooting I put up a kangaroo-rat. I did not see the Eagle until I heard the rush of it through the air as it seized the rat and carried it to a tree close by. The rat was found to be smashed to pulp by the force with which the Eagle had struck it. *Aquila audax* commences to build in April, and I have taken eggs on the 19th July hard set upon. It lays in the same nest year after year if not disturbed; when it has young one sees all kinds of prey under the tree, native-bears, kangaroo-rats and even rock-wallabies are eaten."

Mr. H. L. White, of Belltrees, Scone, New South Wales, sent me the following notes:—"The Eagle-hawk (*Uroætus audax*) is fairly numerous, but not in such numbers as formerly. Some thirty-five years ago, when the system of shepherding was abandoned in favour of paddocking sheep, Eagles were a great curse at lambing time. The ewes were allowed to run, practically unattended, in very large paddocks, and the Eagles levied a heavy toll upon the lambs. I know of an instance where one boundary rider shot or poisoned one hundred and twenty Eagles in eight weeks; probably as many more died unnoticed. After some twenty years of war against them, their numbers were so reduced that the damage done became practically *nil*. At the present time their destruction is not encouraged, as the value of the few lambs they kill is more than balanced by the numbers of young marsupials, hares, etc., they destroy. I have found the Eagle to be a stupid, quiet bird, very inquisitive, and usually easily approached. Upon one occasion, when rolling a large stone down the side of a steep mountain, I heard a rushing sound pass over head and noticed a dark object, with almost incredible speed, follow the stone until a patch of thick timber was reached, when a sudden opening of wings revealed an Eagle. The bird had evidently been attracted by the moving stone, and shot after it with closed wings. Upon another occasion an Eagle seized and attempted to carry off a full grown fox terrier that was following me. Nests are frequently met with, usually in the highest trees growing on sides of mountain spurs. I know of one nest which has been in use for twenty-five years, but whether occupied regularly every year I am unable to say; off and on during the time mentioned I have noticed young birds in it. In 1908 I wanted the eggs, but found a pair of newly hatched young instead. Eagles eggs present a great variety of colouring, those in my collection ranging from heavily blotched to dirty white specimens."

Mr. Thos. P. Austin writes me from Cobborah Station, Cobhora, New South Wales:—"The Wedge-tailed Eagle (*Uroætus audax*) has an extraordinary habit of building a nest for some purpose other than breeding. I know of six nests on this property, only one of which have the birds laid in. In some districts I notice they choose the largest trees to build

in, while in the Lake Tyrrell District in Victoria, I have seen many of their nests on the blue bush plains, built in small bushes not more than eight feet from the ground. Mr. T. Buckland, of Pine Ridge, informs me he saw a nest with one young Wedge-tailed Eagle almost fully fledged, built upon the ground in a wheat crop, near Bathurst, during December 1903."

Mr. E. H. Lane writes me from Orange, New South Wales:—"I have nothing new as to the nesting of the Wedge-tailed Eagle, but as it is very unusual to find a clutch of three eggs, it may be interesting to know that in 1905, which was a splendid season in the Mossgiel District, a friend of mine there, Mr. H. Burcher, took two clutches of that number which he sent me, but unfortunately one egg was broken in transit. I also received from a collector in the same district during that season another clutch of three. These are the only instances I have known during my fifty-seven years experience since first starting my collection. I may say the first pair of Eagles' eggs I took, which are still in my possession, was about five miles from Orange, in October 1858. The difference to be seen in the colouring and markings of eggs of the same clutch is worthy of note. I have a pair one of which is pure white, while the other is rather heavily blotched. Another pair with markings of rather a uniform character, on one egg they are almost blood red, and the other a lavender colour; other sets I have vary considerably. The size of different clutches also varies very much. I give the measurements of my largest and smallest pairs, which are records so far as I have seen in print:—Length (A) 3.14 × 2.41 inches; (B) 3.13 × 2.41 inches. (A) 2.66 × 2.17 inches; (B) 2.62 × 2.17 inches. Another large but rounder pair measures:—Length (A) 3.05 × 2.49 inches; (B) 3.05 × 2.44 inches. In 1905 Mr. Burcher took Eagles' eggs in July. One set of three he obtained on 10th August, and the other set of three on the 31st August, 1905, August and September being the main laying months in the Mossgiel District."

The late Mr. K. H. Bennett, when resident at Yandembah Station, near Booligal, New South Wales, wrote as follows:—" *Aquila audax* was formerly very numerous in this locality, but poison having to be freely laid to destroy dingoes, the Eagles also became victims by taking the baits laid for the dogs. As these latter animals have for many years been exterminated, the Eagles have again become numerous, so much so, that efforts have been made to have them included amongst the noxious animals, from the destruction they cause in the lambing season. From my personal observations I am convinced, however, that the rabbits have no greater natural enemy than the Wedge-tailed Eagle. I have found many of their nests, and beneath all of them the ground was thickly strewn with the remains of rabbits. This bird was also at one time very numerous on Moolah Station, in Western New South Wales, but since the general introduction of stock its numbers have greatly diminished, as owing to the lack of lambs by the depredations of these birds, they are detested by the pastoralist, and are destroyed by various means, chiefly by poison. The nest, which is usually placed in some tall tree, is a large rough structure composed of sticks, and nearly flat, the only lining being a few green Eucalyptus leaves, which are placed in a slight depression in the centre, on which the eggs are deposited. So large is the size of some of their nests, that they will easily contain a man, the object of their large dimensions being to afford space for the depositing of prey, and as a place of exercise for the young. In them I have found the carcasses of full grown Bridled Wallabies, young dingoes and lambs. When the young have gained sufficient strength they may be often seen walking clumsily about the platform. Although the nests are usually built in high trees, I have seen them so low down that I took the eggs from one while standing up on my saddle. It breeds usually in July, and lays two eggs, one egg being generally much more blotched than the other. I have frequently found only one incubated egg, and on one occasion took two eggs which were quite white. Only once have I known a nest to be occupied after being robbed; this was at Moolah Station, from which I took a pair of young birds five years before; although there were a number of others there I robbed about the same time, none of them have been since occupied.

Although Wedge-tailed Eagles prey to a large extent on rabbits, they do not always confine themselves to small quarry of this description, for in Gippsland I have often seen them attack full grown native bears, and on one occasion a pair attacked a half grown kangaroo, but I did not see the result, as it was in a thickly timbered place. When they passed me the kangaroo was going at its utmost speed, with one Eagle perched on its neck and flapping its wings about its face, evidently with the intention of terrifying and confusing it, the other Eagle flying alongside. I also saw, on another occasion, a pair kill a full grown dingo. I did not see the commencement of the attack, but when I came across them they had evidently been at the dog some time, for he was very much exhausted, and was staggering along in an aimless manner. One Eagle was perched on the dog's neck and flapping its wings, the other perched on his loins; occasionally the latter would turn his head and snap in a feeble manner at the Eagle, who would simply fly up, and the next instant drop on the loins again. This continued for some time, the dingo evidently getting weaker and weaker, until he stumbled, fell and lay perfectly still. I saw the Eagles walking round him, and then begin tearing at his flank with their bills. I waited and watched for some little time longer, and then rode up and found the dingo, which was in fine condition, quite dead. Although the Bridled Wallaby (*Onychogale frenata*, Gould), is not strictly nocturnal on the Lower Lachlan River, in Southern New South Wales, it is very rarely met with away from the shelter of the dense bush or scrub during the day. The reason of this is its dread of its terrible enemy, the Wedge-tailed Eagle, this bird destroying great numbers, particularly during the nesting season, when the nests and the ground beneath are strewn with the remains of this animal.

"The note of the Wedge-tailed Eagle is well represented by the syllables 'Dirra lich, Dirra lich,' quickly repeated several times in a shrill tone. This bird as a rule nests in the early part of July, and the young leave the nest about the end of November. On one occasion, however, I found a nest containing young ones early in July."

Mr. Robert Grant, Taxidermist of the Australian Museum, has handed me the following notes:—"In November, 1883, while on a collecting trip at Colliburi Station, Narromine, New South Wales, Mr. Stevenson, one of the proprietors, pointed out a Wedge-tailed Eagle's nest in a large Gum-tree close to the river, and told me that it contained young, as he had noticed the birds carrying food to the nest. As I was anxious to secure both parent birds and young, I was up at sunrise next morning, and placed myself in concealment within gun shot of the tree. Although I waited there three hours neither of the parent birds came near, and I left for camp, one of my companions relieving me. We watched in turn all that day and the next, with the same result, and then decided to cut down the tree, as it was hopeless to attempt to climb to the nest. After some hard work we felled the tree, and when the dust had cleared away we found a young bird apparently about a week old, and fortunately alive. The heap of sticks and rubbish of which the nest was formed would have filled a large dray; in it were the remains of small wallabies, 'Wood Duck,' Straw-necked and White Ibises, and a White-fronted Heron. We remained in the vicinity another two days, but I only saw one of the parent birds once, and that was at a great height in the air. I took the Eaglet home with me to Lithgow, and we had no difficulty in rearing it, as it could eat butcher's meat and small birds readily. When it reached maturity we built a large aviary of battens. For the first five years its head and neck feathers were of a pale fawn colour, for a similar period they were rich rufous-brown on these parts. After the next moult, and when ten years old, the entire plumage changed to a glossy black, and remained so ever afterwards. During its captivity it was answerable for the lives of a few domestic cats that used to go into its aviary after the meat or birds, but although it killed them it did not eat them. When eighteen years of age this Eagle met with its death in a tragic manner; the yard of our house adjoined the Lithgow Iron-works, and the burning slag set fire to its aviary, and although my brother quickly rescued it at the time, it only lived a few hours, the shock killing it. On skinning and dissecting the bird it was found to be a male.

“Once when on the mountains at Lithgow my brother and I surprised a Wedge-tailed Eagle that had just killed a native bear, in fact it was not quite dead. My brother went home and returned with a gin-trap, of which I muffled the teeth with rags, and set it close to the bear, which was laying at the butt of a tree, covering the plate of the trap with fallen leaves, and securing the chain of it to the tree. On returning there from our shooting about five hours afterwards, as I expected we found the Eagle caught in the trap by one leg. We killed it, and it proved to be a large female with the feathers of the head and neck pale fawn colour.”

Dr. W. Macgillivray writes me from Broken Hill, in South-western New South Wales:—
 “Every Sunday on my way to a mine, where I consulted once a week, ten miles south of Broken Hill, I had an opportunity of observing a pair of *Uroætus audax*. They subsisted mostly on rabbits, which were plentiful. They had their eyrie in a Gum sixty feet from the ground, on a sandy-bedded creek which ran at right angles to the road. Early in June I took two fresh eggs from the nest; the latter was the usual huge structure of sticks and branches that had evidently been renewed, as the foundation was old; the egg cavity was as usual lined with green Gum leaves and branchlets; the birds sat on the nest until I drove up to the tree. It is interesting to note that these eggs were laid two months before this species usually lays in Victoria, and a month later than I have notes of them laying in the Gulf District in Queensland. On the under surface of this nest were nests of the White-face (*Xerophila leucopsis*) and Chestnut-eared Finch. This Eagle laid again, and was sitting on eggs on the 4th August, but these eggs were taken by some boys. She laid a third time, the young birds being taken from the nest in November. *Uroætus audax* is relentlessly persecuted by the pastoralist on account of its suppose proclivity for lambs, which I do not think is justified. Very few pastoralists whom I have questioned on the point have actually seen an Eagle kill a healthy lamb, it is with them purely a matter of assumption. I grant that an Eagle may sometimes be found eating a lamb, or the remains of a lamb may be found about a feeding platform, but it must not be forgotten that Eagles feed on carrion, and that the lamb was dead in ninety-nine cases out of a hundred before the Eagle touched it. The lambs more often than not killed by Eagles are usually the weaklings of the season, and it is doubtful if they would survive under any circumstances, and if killed off their killing tends to raise the standard of the flock; it is one of nature’s methods of culling out the unfit. During nine years’ residence in the district I have seen many Eagles, and examined some hundreds of their nests and feeding platforms, and have not in any single instance found the remains of a lamb in any one of them. The rabbit forms throughout this district their staple food supply, its remains are to be found on every platform and nest, and littering the ground below them, and freshly killed rabbits are found on every nest where there are young ones. Under one nest on Langawirra Station, Mr. W. McLennan and I counted the remains of over two hundred rabbits, and I maintain that the good done by the Eagle in helping to keep down this pest throughout the year more than compensates for a few weakly lambs which may be taken during the lambing season, which lasts only for two months at most. The pastoralist by his want of judgment in overstocking the country, and grazing out to the point of extermination most of the natural herbs, shrubs and even trees, and not conserving his water supply, has killed millions more sheep in a single season by slow starvation than all the Eagles in Australasia have done since the first occupation of the country by a more merciful death. At one or two of the nests examined in 1909, I found the remains of the Stump-tailed Lizard (*Trachysaurus rugosa*), a common reptile in these parts, and also the Jew Lizard (*Amphibolurus barbatus*). Nests are placed either in the Gums along the creeks, at heights varying from twenty to eighty feet, or out in the open often low down in a Mulga or Leopard-tree. I have also seen the top of a Pine-tree covered with a nest. Eggs are laid from June until the early part of September, my earliest record being the 10th June and my latest 10th September.”

Mr. G. A. Keartland writes from Melbourne, Victoria: "Decided difference of opinion prevails as to whether the Wedge-tailed Eagle is a useful or destructive bird. The squatters wage war against it with rifle, trap and poison because, they assert, it kills lambs. Others who have studied the bird carefully, and examined their nests containing young ones, claim that it lives almost exclusively on rabbits and hares, where they can be obtained. That they will feast on the carcase of any dead beast is well known, hence the number killed by poison. I once made a number of cuts in a dead cow, and treated each with strychnine, intending to poison dingoes. Next day we found seven dogs and nine Eagles poisoned. But in the interior of Australia it is interesting to watch a pair of these birds hunting wallabies, bandicoots, &c. At Finke Gorge, in the Macdonnell Ranges, I saw several pairs working amongst the rocks. They soared at a great height until they had located their prey, and then one would fly as close to the wallaby as possible, but owing to the length of its wings the quarry escaped by keeping close to the rocks and dodging around the boulders. But if the animal tried to cross an open space it was at once seized. When crossing the margin of the Great Desert of North-western Australia, we frequently watched these birds hunting in couples. First they soared high in the air, and flew away for some distance, but soon returned, one skimming along close to the Spinifex, whilst the other remained about one hundred feet above. If the lower bird missed its victim the other took up the chase, the birds changing positions until they were successful. At Beveridge, Victoria, I noticed sixteen Eagles flying high overhead, and although there was a great number of newly born lambs in several paddocks within sight, they were not molested, but two of the Eagles came down flying near a post and rail fence, where they disturbed a hare, which followed the line of the fence for some distance and then stopped under the rail. One Eagle perched on the fence about fifty yards behind the hare, but its mate flew ahead for about two hundred yards, and then perched on a post. The hare was disturbed again, and chased until it approached the bird on the post, which spread its wings, scaring the hare into the open, when it was caught by the pursuing bird."

Dr. A. M. Morgan writes as follows from Adelaide, South Australia:—" *Uroæetus audax* is fairly common throughout South Australia. I have either taken or received eggs from every part, including Central Australia and the Northern Territory. Almost invariably one egg is markedly lighter in colour than the other. On the 27th August, 1896, I took a single egg from a nest near Point Sturt, Lake Alexandrina, which was almost pure white, and so conclude that the light coloured egg is laid first, but unfortunately the bird did not lay a second egg, which of course might have been white also, as I have seen a clutch of two taken on Yorke Peninsula which were both quite white. At the Finnis River I knew of an old nest, almost fifty feet from the ground, in a dead Gum tree standing out on a plain, which had not been occupied for nine years. On the 21st August, 1898, I was driving past it with my brother, when we saw a pair of birds soaring over it. My brother climbed up, and found two slightly incubated eggs. On the 11th August, 1900, I found a nest in the Gawler Ranges, built in a Myall, the bottom of which could be easily reached from the ground; it was lined with green Myall leaves, but contained no eggs. All the clutches of which I have dates were taken in July and August."

During a trip made by Dr. A. M. Morgan in July and August, 1900, to Mount Gunson, one hundred and forty miles north-west of Port Augusta, a nest of *Uroæetus audax* was found at Monaleena on the 2nd August, containing two slightly incubated eggs, and another at the former place, in a large Gum tree, which was inaccessible: the bird was sitting in the latter nest. In August of the following year, in company with Dr. Chenery, "these birds were found common throughout a trip made from Port Augusta to the Gawler Ranges. They were seen singly, or in pairs soaring or feeding on carcasses of sheep. Only one nest was found, in a small Myall about five feet from the ground: it was lined with green leaves, and was just ready for eggs."

Dr. A. Chenery, writing me from Port Augusta, South Australia, on the 11th June, 1905, remarks:—"To-day I went to the Flinders Range, twelve miles from here. We have had good rains, and there is green herbage about in profusion, but no birds building yet except one Wedge-tailed Eagle (*Aquila audax*). The nest was built in a Pine tree on the side of the range, twenty-five feet from the ground. One egg and a recently killed black rabbit also reposed in the nest. In my experience this Eagle is always an early layer, but not quite so early as this. I saw the young in August, 1904."

Mr. Tom Carter writes as follows from Broome Hill, South-western Australia:—"The Wedge-tailed Eagle (*Uroastus audax*) was abundant in the Gascoyne River, Western Australia, in 1886, and was very destructive to lambs. I have seen their nests built on the tops of flat bushes, about ten feet from the ground, in the coast country where there are no trees. Other nests visited were from twenty to thirty feet from the ground, in White Gums. From one nest I three times disturbed a bird sitting as if on eggs, but although I climbed up on each occasion the nest was empty. At Point Cloates, North-western Australia, eggs were laid very regularly about the end of May. One is the usual number, but occasionally two are laid. One nest was built on a ledge about twelve feet from the top of a deep gorge, in the North-west Cape Ranges. Coming to the edge of the cliff above the nest on 22nd May, 1900, the old bird flew off, and I gave it both barrels of my gun, apparently without effect, and took the egg. On 28th May, 1900, the same thing occurred, and I again took an egg from the nest, a large freshly killed domestic cat, run wild, was on the edge of the nest. On 4th June, 1900, the same nest contained a third egg. A short time after this another nest was built about a mile further on, in the same range, presumably by the same pair of birds, and from this nest I also took an egg. This Eagle is fairly common in the south-west corner of Western Australia, where it builds in the vast forests of Jarrah, etc. At Broome Hill, where the timber is lighter and open, these birds visit the lambing flocks in numbers, and cause great destruction. There were two old nests in my paddocks, where I was told eggs were laid about 1904. One nest was fifty feet from the ground, in a tall Yate-tree; the other nest, about forty feet, in a dead White Gum. One day in October, 1908, while mustering in a paddock with my man, we found a three-parts grown kangaroo (boomer) 'bailed up' in a corner of the fence by two Wedge-tailed Eagles. Our passing by doubtless saved the kangaroo's life, as it was quite exhausted. The same day two ewes were left, as they did not travel very well, and returning for them in the evening I found Eagles had killed both, so I put strychnine in the carcasses, and next morning found six Eagles dead close to the skeletons of the sheep, the bones having been picked clean of meat. Two Eagles that had died on their backs had their breasts eaten by their comrades."

Dr. Lonsdale Holden, while resident at Circular Head, on the north-west coast of Tasmania, forwarded the following notes:—"I saw *Aquila audax* flying over Sisters Hills in May, June and August, 1886. When observed from below as it flies, one sees this bird's wedge-shaped tail very plainly. In March, 1887, I saw a pair of Black-cheeked Falcons that are resident about the cliffs at Circular Head, mobbing a Wedge-tailed Eagle that had been frequenting the Bluff for some weeks, making dashes at it as Crows and other birds do to the Raptores in general. In March, 1890, I rode up to one sitting on a small tree, on a plain west of Duck River, which allowed me to approach within fifteen yards, and would perhaps not have flown away at all if I had not stopped my horse."

Mr. E. D. Atkinson, while resident at Table Cape, on the north-west coast of Tasmania, sent me the following notes:—" *Aquila audax* is widely distributed over Tasmania and the islands of Bass Straits. I have observed this bird along the coast country from the South-west Cape northwards to the Pieman River mouth, on the west coast. I have found it about the Lake country in the interior, and the Midlands, which localities seem to be its chief habitat."

Mr. Malcolm Harrison writes me from Hobart, Tasmania, :—"The favourite hunting ground of the Wedge-tailed Eagle (*Uroetus aulax*) is no doubt the comparatively open sheep country of the Midlands, where some years ago it was an every day sight to observe them wheeling in wide circles at a great altitude. Their numbers have now been considerably reduced, but they still breed at the foot of the Western Tiers, in the lofty Eucalyptus trees of that locality, and in a few other favoured spots. In these southern parts we see one occasionally only, although a few places are known in which they still continue to nest. In my experience the local eggs are as a rule larger than those of the mainland which have come under my notice. The principal breeding month here is September."

For the purposes of breeding it adapts itself to its environment, but the huge nest of sticks lined with Eucalyptus leaves is generally from twenty to seventy feet or more from the ground. Where not interfered with, as near the northern portion of the border line of New South Wales,



NEST OF THE WEDGE-TAILED EAGLE ON NULLABOR PLAINS, SOUTH AUSTRALIA.

and the Nullabor Plains in South Australia, it is frequently built in a tree so small that it will just carry the nest, and may be looked into by one standing on horse or camel back, as may be seen in the above figure. The photograph from which it was reproduced was taken by Mr. Chas. G. Gibson, on the 1st October, 1908, during the survey of the Transcontinental line from Coolgardie, Western Australia, to the eastern boundary of that State. It was deserted by the Eagles, but when examined by Mr. Gibson contained three half-fledged Brown Hawks. Again it may be built on a rocky eminence, or as pointed out by Mr. Austin, on the ground in a wheat field. They vary, too, much in size, and usually a number of fallen sticks and remains of mammals and birds are found underneath the tree. A medium sized nest in the Group Collection, presented by Mr. A. W. Mullen, is an open and nearly flat structure, formed entirely of thick sticks; its average greatest width externally is four feet six inches, and its depth two feet four inches, the nesting cavity measuring three feet in width, by four inches in depth. This nest was built at the junction of four branches with the trunk of a Coolibah tree (*Eucalyptus dumosa*) thirty feet from the ground, and was obtained after five hours work by Mr. A. W. Mullen, on

Beemery Station, near Bourke, Western New South Wales, on the 30th August, 1904. It contained a nestling in pure white down, with black quills, and fawn upper wing-coverts, and a perfectly fresh egg, which I blew. On the platform were portions of egg shells, the remains of rabbit skins, and a recently killed young rabbit. The lining of the nest consisted of dried fragments of Eucalyptus leaves, broken by the sitting and the young birds from the length of time they had been picked; but they are lined with fresh Eucalyptus leaves every season. This nest was infested very much with insects, principally carrion beetles, usually found haunting old carcasses, and attracted to it by the numerous remains of rabbits and other mammals. The nest had to be drenched with bisulphide of carbon before it could be mounted and placed in the collection. The underside of the nests of the Wedge-tailed Eagle are resorted to by several species of smaller birds as nesting sites, but in Eastern Australia principally by *Apheloccephala leucopsis*, *Geobasiliscus chrysorrhous*, and different species of Finches. Mr. Mullen wrote:—"The Eagle left the nest as soon as we approached, and never came near again. We poison the Eagles on the station for killing the lambs."

The following extracts are made from the Sydney morning papers:—"The lambing is nearly over in the Deniliquin District, and averages up to 86 per cent. have been reported. The Eagle-hawk pest is a greater nuisance this year than last, no fewer than one hundred and twenty eight birds having been sent in from one station." "Eagles are very destructive in the Bourke District, killing many lambs."†

The eggs are usually two, sometimes only one, and very rarely three in number for a sitting; typically they are swollen oval in form, and occasionally almost globular, the shell being coarse-grained, but smooth and lustrous in some, dull and lustreless in others, and vary considerably in size. They are of a dull white ground colour, which is freckled, boldly spotted, and blotched with reddish-brown, forming confluent patches, or entire caps, and frequently at the smaller ends; on others the markings are pale brown, or they are mottled all over with pale lilac-grey, as a rule, or intermingled reddish-brown and lilac-grey; there is a tendency to form large clouded patches on one part or other of the shell, while in some the markings are small and almost invisible, or have a blurred appearance, or they may be entirely devoid of markings, and of a uniform dull white, although occasionally they are nest stained. The latter variety closely resembles the eggs of *Haliastur leucogaster*. A set of two taken by the late Mr. K. H. Bennett, at Mossgiel, New South Wales, in July, 1886, measures:—Length (A) 2·86 × 2·36 inches; (B) 2·87 × 2·24 inches. The egg taken by Mr. A. W. Mullen, at Beemery Station, in the Bourke District, New South Wales, in August, 1904, measures:—Length 2·72 × 2·18 inches. A set of two taken by the late Mr. K. H. Bennett on Moolah Station, in July 1879, in the Central District, New South Wales, measures:—Length (A) 3·02 × 2·26 inches; (B) 3·03 × 2·25 inches; the latter egg is represented on Plate B. XIX., fig. 3. A set of two taken by Mr. Edward Lord Ramsay at Wattagoona Station, near Louth, on the 7th July, 1888, measures:—Length (A) 3·03 × 2·28 inches; (B) 3·1 × 2·44 inches. A set of two taken at Yandembah Station by the late Mr. K. H. Bennett, on the 6th July, 1888, measures:—Length (A) 2·7 × 2·25 inches; (B) 2·73 × 2·24 inches. The former egg of this set is a uniform dull white, the latter freckled, spotted and blotched with different shades of lilac-grey, forming confluent patches on the smaller end.

When the young are about a fortnight old they are clothed in pure white down, which is long and hair-like about the head and neck, and there is just an indication of the black quills. About five weeks old the down is very much shorter, especially on the head, where a few rufous feathers appear, the upper wing-coverts and back are brown, with patches here and there of white down, and the quills are dark brown, there are a few scattered darker brown feathers among the down on the rump, and the short tail-feathers are brown with whitish-brown tips; on

* Sydney Morning Herald, 3rd June, 1895. † Daily Telegraph, 25th April, 1900.

the under surface, among the short white down are some scattered bright rufous feathers on the foreneck, flanks, abdomen and thighs. Wing 6·2 inches. When very much older nestlings still retain the white down on parts of the body, and even at the ends of the tips of the secondaries and tail-feathers, the head, nape and hind-neck have rufous-brown feathers intermingled with the down, the general colour of the upper parts being dark brown, with pale rufous-fawn tips to the upper wing and under tail-coverts, the longer feathers of the latter pale rufous-buff; tail-feathers dark brown, their inner webs pale brown crossed with a dark brown bar; throat, foreneck and centre of upper breast covered with short dull white down, with scattered rufous-fawn feathers on the upper part of the foreneck; remainder of the under surface blackish-brown with small buffy-white tips to the feathers, under tail-coverts light fawn colour. Total length 25 inches, wing 13·5, tail 9.

In Eastern Australia the breeding season is usually early, the birds commencing to build in April and May, nests being found with eggs in June, but more often in July and August, although young birds may be found in the latter month. The young birds remain in the nest a long time before leaving it, and there are specimens in the Australian Museum Collection taken from the nest on the 24th December. In Southern Australia the season is generally a month or two later. The birds evidently pair for life. Mr. John Hamilton informs me that a pair, presumably the same birds, have nested for a period of thirty-three consecutive years in two trees on his estate, near Mooroopna, Victoria; one of the trees has since been burnt down. An instance of early breeding is recorded in a note from Dr. A. Chenery, South Australia, he finding a nest with an egg on the 11th June. Still earlier is Mr. Tom Carter's note from Point Cloates, North-western Australia, recording the taking of an egg on the 22nd May and two on the 2nd June, and finding half grown young on the 25th July.

Genus NISÆTUS. *Hodgson.*

Nisætus morphnoides.

LITTLE EAGLE.

Aquila morphnoides, Gould, Proc. Zool. Soc., 1840, p. 161; *id.*, Bds. Austr., fol. Vol. I., pl. 2 (1848).

Hieratus morphnoides, Gould, Handbk. Bds. Austr., Vol. I., p. 11 (1865).

Nisatus morphnoides, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 251 (1874).

Entolmactus morphnoides, Sharpe, Hand-l. Bds., Vol. I., p. 262 (1899).

ADULT MALE.—*General colour above brown, head and hind neck pale tawny-rufous streaked with black, more broadly on the forehead, crown of the head and nape, the apical portion of the feathers of the latter entirely black: wings blackish-brown, the median series of upper wing-coverts slightly lighter, and having broad whitish-brown margins, as have also the ends of the secondaries, the scapulars slightly washed with ashy: upper tail-coverts brown, the lateral ones pale brownish-white: tail-feathers ashy-brown, whitish at the tips, and crossed with more or less distinct blackish-brown bars, the sub-terminal one being the broadest: ear-coverts blackish-brown with rufous-fawn margins; all the under surface pale rufous-brown, each feather mesially streaked with black on the upper breast, and having narrow blackish shaft lines; the vent, thighs and under tail-coverts uniform pale rufous-fawn colour: "bill bluish at the base, black at the tip: cere bluish; feet whitish, claws black: iris orange colour" (Bennett). Total length in the flesh 18·5 inches, wing 13·3, tail 8, bill 1·2, tarsus 2·2.*

ADULT FEMALE.—*Larger and paler than the male, and the black mesial streaks to the feathers of the head and upper breast narrower. Total length 22·5 inches, wing 15·5, tail 9·25.*

Distribution.—Queensland, New South Wales, South Australia, Central Australia, Western Australia.

ON comparing the preceding description with Gould's original one of this species in the "Proceedings of the Zoological Society of London," and the figure in his folio edition of the "Birds of Australia," it will be found to agree with neither in hardly any respect. It is not, however, that of the typical form, Gould procuring the type of this species on the Hunter River, but of the one most frequently found in New South Wales. Of no species of the Australian Accipitres is there so wide a difference in colour; for it may either have the under parts, especially the females, pale fawn colour, or faint creamy-white, with brown or blackish shaft stripes on the upper breast, or brown or rufous-brown, with conspicuous blackish central streaks to the feathers, the head and nape too being very much darker in this variety. Of the fourteen adult specimens in the Australian Museum Collection now before me, ten belong to the light variety, as described above, and were all obtained by the late Mr. K. H. Bennett, in the Lachlan River and Mossgiel Districts, New South Wales. Of the dark variety with the conspicuous brown or rufous-brown under parts, an adult male and female were obtained by Mr. George Masters, at King George's Sound, Western Australia, in April, 1866, an adult female shot from the nest, received from the late Mr. George Barnard, Coomoooolaroo, Duaringa, Queensland, together with the eggs, in March, 1883, and an unlocalized specimen.

Although widely distributed over the Australian continent, the Little Eagle is by no means common anywhere, its stronghold apparently being the central and south-western portion of New South Wales. The late Mr. K. H. Bennett's remarks about the shy and wary habits of the male, is borne out by the adult specimens in the Australian Museum Collection, of which there are twelve females and only two males.

Mr. H. G. Barnard, of Bimbi, Duaringa, Queensland, writes me:—"In September, 1906, I found a nest of *Nisæus morphnoides* built in a Swamp Gum. The nest was on a projecting limb of a flat fork; it then contained a single egg, out of which the young bird had almost made its way. On the underside of this nest was one of the Banded Finch (*Poephila cincta*), which contained young and eggs, while in near proximity were no fewer than three other nests of *P. cincta* built in the branches of the Eucalyptus; they all contained young birds. In 1907 I visited this nest on the 20th August, and on approaching the tree the bird flew off; on climbing the tree the nest, fifty feet from the ground, was found to contain a single egg slightly sat upon. On the 10th of September, 1906, I observed a pair of these birds commencing to reline an old Crow's (*Corvus coronoides*) nest, within a quarter of a mile of the house; the male was very dark; by the end of September they seemed to have completed the nest, as they did not add to it; the birds remained about till the 15th October, when a single egg was laid. I left it for a few days, hoping a second egg would be there, but as the bird commenced to sit I took the egg. This Crow's nest was seventy feet from the ground, and measured externally two feet six inches in diameter by one foot in depth, the egg cavity, formed of leaves, measuring ten inches in diameter by three inches in depth. The usual number of eggs in a set is one, sometimes two. The food of the Little Eagle consists chiefly of various reptiles, principally Frilled Lizards, of which some very large ones are killed, the male bird carrying them to the nest to feed the female while sitting, generally about sundown, then flying away to roost in a tree some distance off. The nests vary very much in height, I have taken some as low as twenty feet, others have been seventy or eighty feet from the ground."

The late Mr. K. H. Bennett wrote me:—" *Aquila morphnoides* is very restricted in its habitat in the Lachlan River District of New South Wales. I have never met with it south of that river, and only over a distance of about sixty miles to the north, its home appearing to be the wide open plains, dotted with occasional belts and clumps of timber, although it is by no means numerous even there. Though somewhat inactive in habits, it is extremely shy and wary, the

male being more difficult to obtain than the female. The only way I could procure specimens was to secrete myself carefully within gunshot of the nests, and await the return of the birds. Its powers of flight, although strong, are by no means swift, and its prey, which consists of various small mammals, reptiles, and young birds, such as Crows, Magpies, &c., is almost always captured by watching and suddenly pouncing up on them. Like *Aquila audax* it is very destructive to rabbits, which animal it watches for with the utmost patience. The nest, which is very small for the size of the bird, is a loosely constructed fabric, almost flat, and composed of sticks lined with a few green Eucalyptus leaves, the top of a Pine (*Callitris*, sp.) or Box (*Eucalyptus*, sp.), some twenty or thirty feet from the ground, and the only trees of any size in the locality, being a favourite place for building. As a rule it lays but one egg, though two may be occasionally found. On the 17th October, at Mossgiel, I found a nest containing a young one about a week old, and wishing to obtain a specimen in a more advanced stage, I left it intending to return at a later date and get it. Unfortunately I was unable to visit the locality until the 24th December, when I expected to find the nest empty, but to my surprise found a young one just hatched. The birds must either have bred a second time, or another pair had taken possession of the nest. I took an egg at Yandembah Station, Lachlan River, on the 20th of August, 1888, from a nest placed on a branch of a Box-tree, about twenty-five feet from the ground. On riding into the clump of trees in which the nest was situated, I started a rabbit, which ran a short distance and then squatted. The male bird, who was soaring overhead at the time, observed the rabbit, and descended on it like a stone, clutched it in his talons, held it for a second or two, relaxed his grasp and mounted for a few feet in the air, and then alighted on the ground beside the rabbit, which, on riding up, I found was dead. On the 11th September, 1889, I shot from the nest a fine example of *Aquila morphnoides*; the nest contained but one egg, on which the parent bird had been sitting for some time. I also took an egg from a nest in a Pine-tree on the 16th October, 1890. These birds are now rare in the locality, although formerly numerous. At Mossgiel, on the 2nd November, 1879, I took a young bird just hatched from the nest, in the down, and shot the parent bird, which I presented to the Trustees of the Australian Museum. On the 11th December, 1883, I shot a young bird about three months old, and on the 24th December, 1883, I took a young bird about two months old from the nest, both of which are in the Australian Museum. These birds usually commence to breed early in September, and the young leave the nest about the end of December. They make a new nest every season."

Dr. W. Macgillivray writes me as follows from Broken Hill, in South-western New South Wales:—"The Little Eagle is found quite commonly along all the creeks which intersect the open country. It is a quiet and inoffensive bird, subsisting almost wholly upon rabbits now that that rodent has displaced all the smaller native animals. It is not easily alarmed, and sitting in a tree will allow of a close inspection, but on too close an approach flaps slowly away. It is often seen soaring high in the air, especially on a fine summer's day, the wings then are not outstretched to the same extent as those of the Wedge-tailed Eagle or Kite. The only cry I have heard it utter is a plaintive piping one, and then only when persecuted by Crows; at all other times it is silent. Nest building starts about the beginning of August, the site usually chosen being the topmost forks of a thin limb on a Gum, the nest being a bulky structure of sticks, something like a Raven's when seen from below, but always lined with green leaves, the average external diameter being about two feet, and of the egg cavity about eight to ten inches by two and a half inches deep. From its bulk and situation the nest rarely lasts from year to year in a region where violent wind storms prevail, and so is rarely relined and re-occupied two seasons in succession, excepting where an individual has departed from the general habit of this species, and chosen a more stable situation. Only one brood is reared, unless the eggs are destroyed or taken, when the birds nest again. One pair of birds will nest in the same tree or neighbourhood year after year. Eggs are laid during September and the early part of October, my earliest record being the 27th August and latest 29th October, most of the eggs being laid

during the latter half of September. In about two-thirds of the nests two eggs are laid, the remaining third containing only one as a clutch. The one egg which forms a clutch shows the same variation as to size and disposition of markings as is seen in the two egg clutches, and this is remarkable; many of the eggs cannot be distinguished from those of the Whistling Eagle; others resemble the eggs of the Allied Kite. When hatched the young are covered with creamy white down."

Mr. G. A. Kearthland, of Melbourne, Victoria, writes me as follows:—"In 1894 two Little Eagles (*Aquila morphnoides*) were shot near Oakleigh, Victoria, and in 1899 another was killed by Mr. G. E. Shepherd, at Somerville, while attacking poultry. The Little Eagle is very courageous in pursuit of its prey, preferring live game when procurable."

Mr. Edwin Ashby writes me from Blackwood, South Australia:—"At Black Spring, ninety miles north of Adelaide, I saw about six *Nisætus morphnoides* sitting on the ground around a lagoon frequented by waterfowl, as there were no trees for them to perch upon. This species is common on the Murray River."

Mr. Tom Carter writes as follows from Broome Hill, South-western Australia:—"The Little Eagle (*Nisætus morphnoides*) was a rare species about Point Cloates, North-western Australia, one bird only being seen and shot in April, 1900, as it sat in a tree near a flooded White Gum Swamp, watching a flock of wild Ducks."

One egg is nearly as frequently laid for a sitting as two; they are rounded ellipses or swollen oval in form, coarse-grained and lustreless, of a dull white or faint bluish-white ground colour, which may be either spotted and blotched with very pale red or yellowish-brown, or have small dots, short streak and hair lines of faint purplish-brown, and similar underlying markings of light purplish-grey. In some the spots and blotches are all subsurface, and of a very faint brown or purplish-brown, the markings being evenly distributed; others may have them at one end, or be entirely free from them. A set of two received from the late Mr. George Barnard, of Coomoolaroo, Duaringa, Queensland, in March, 1883, together with the skin of the female, measures:—Length (A) 2.22 × 1.74 inches; (B) 2.15 × 1.7 inches. Two eggs from different nests, taken in the same locality in October, 1888, measure:—Length (A) 2.27 × 1.7 inches; (B) 1.25 × 1.69 inches. An egg taken by the late Mr. K. H. Bennett, at Yandembah Station, Lachlan River District, New South Wales, on the 29th August, 1888, measures:—Length 2.26 × 1.73 inches. Another taken in the same locality on the 11th September, 1890, measures 2.31 × 1.78 inches; this is a remarkably heavily blotched specimen. A set of two taken by Mr. H. Greensill Barnard, at Bimbi, Duaringa, on the 31st August, 1908, measures:—Length (A) 2.2 × 1.78 inches; (B) 2.21 × 1.82 inches.

When the young are first hatched they are covered with pale creamy white down, which is longer and more hair-like on the head and upper parts. At about two months old the crown of the head, nape and hind-neck are rufous, with blackish centres to some of the feathers of the crown of the head and nape, and having short white down on the forehead and centre of hind-neck, the remainder of the plumage of the upper parts almost similar to that of the adult male; throat and sides of neck covered with short creamy-white down, and which is also intermingled with the rufous-fawn coloured plumage of the remainder of the under surface, the abdomen and thighs being of a clearer fawn colour. Total length 14 inches, wing 9. At three months old, and fully fledged, the plumage is almost similar, but it has lost the down, the eyelid is blackish, as is also a narrow line of feathers above and below the bare skin surrounding the eye; the feathers on the under parts are pale rufous, those on the upper breast having narrow blackish shaft lines. In this stage of plumage the under parts are darker than in the adult. Wing 13.5 inches.

In Eastern Australia nests with eggs may be usually found in August, September, October and sometimes as late as November, Mr. E. H. Lane sending me a note of a set of eggs in his collection taken in the Mossgiel District on the 4th November, 1910, and young birds in December, January and February.

Genus HALIAËTUS. *Sarigny.*

Maliaetus leucogaster.

WHITE-BELLIED SEA-EAGLE.

Falco leucogaster, Gmel., Syst. Nat., tom. I., p. 257 (1788, ex. Lath).

Ichthyiaetus leucogaster, Gould, Bds. Austr., fol. Vol. I., pl. 3 (1848).

Poliaetus leucogaster, Gould, Handbk. Bds. Austr., Vol. I., p. 13 (1865).

Haliaetus leucogaster, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 307 (1871); *id.*, Hand-l. Bds., Vol. I., p. 267 (1899).

ADULT MALE.—*The entire head and neck all round, and all the under surface and under tail-coverts white; upper surface of body and wings dark grey, with a brownish wash; tail feathers brownish-black, the terminal third white; bill bluish-horn colour and blackish at the tip of the upper mandible; cere and lores lead colour; legs pale greyish-white, passing into yellowish-white on the feet; iris brown. Total length in the flesh 30 inches, wing 21.5, tail 10.75, bill 2, tarsus 4.*

ADULT FEMALE.—*Similar in plumage to the male, but slightly larger. Wing 24 inches.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia, Tasmania.



WHITE-BELLIED SEA-EAGLE.

THE White-bellied Sea-Eagle is found at intervals all along the coast-line of Australia and Tasmania, frequenting the bays, inlets and estuaries of rivers. It is not, however, confined to the sea-board, for it frequents rivers, lakes, and watercourses far inland, being found on the Darling River, at Bourke, New South Wales, over five hundred miles from the coast. A fine specimen was also received by the Trustees of the Australian Museum from the Bogan River, where it was nesting. Gould remarks:—"Unless disturbed or harassed, the White-bellied Sea-Eagle does not shun the abode of man, but becomes fearless and familiar. Among the numerous places in which I observed it in 1839 was the Cove of Sydney, where one or two were daily seen performing their aerial gyrations above the shipping and over the tops of the

houses; if I mistake not, they were the same pair of birds that found a safe retreat in Elizabeth Bay, skirting the property of Alexander Macleay, Esq., where they might be frequently seen perched on the bare limb of a tree by the water's edge, forming an interesting and ornamental addition to the scene. . . . Whether as a result of the progress of civilization and the destructive hand of man, this fine bird has been extirpated from the precincts of the great city of Sydney, and similarly populous places, is for the present race of Australians to say; in all probability this to a certain extent has been the case: still the bird will hold its own in other parts of the colony for a long time to come; yet (and it is pitiable to contemplate such a contingency) a period will doubtless arrive when the bays and inlets of the southern coasts of Australia will no longer be adorned by the presence of this elegant species." As seventy-two years have elapsed since Gould noted this species in the Cove of Sydney, it is interesting to record that the White-bellied Sea-Eagle still occurs in Port Jackson, although it is not nearly so frequently seen



MIDDLE HARBOUR, NEAR ROSEVILLE PARK, A HAUNT OF THE WHITE-BELLIED SEA EAGLE.

as it was ten years ago. On the upper parts of Middle Harbour, an arm of Port Jackson, and about seven miles from Sydney, I have often seen these birds while fishing, and a pair have bred for many years near the head of this inlet. In former years a pair of birds used to breed considerably lower down towards the entrance to Middle Harbour, but the tree they nested in was cut down. There is a pair of immature birds in the Australian Museum Collection, obtained in January, 1877, that were reared in this nest, and an adult male received from Dr. H. Ward, procured in the same locality in May, 1891. There is also an adult female procured by Mr. John Ramsay, at Dobroyde, in 1864.

Of specimens in the collection obtained in other localities some distance from Sydney, is a semi-adult female procured at Tuggerah Lakes, and a young male from Lake Macquarie. From Queensland there are two specimens procured by Mr. George Masters at Wide Bay, in 1867,

and one from Gayndah, on the Burnett River, in 1870. Near Brisbane, Queensland, I noted a pair of these birds on the Brisbane River and Breakfast Creek, in November, 1907.

At Roseville I have often noted one, or the pair of birds belonging to the nest at Middle Harbour, flying across to Lane Cove. On the 31st May, 1901, I saw one of these birds rise from near the surface of the water at Middle Harbour, the five outer primaries standing out separate and distinct like the spread fingers on one's hand, and resembling altogether with its long wings and short tail a huge moth. Slowly it started to soar in circles in a gently rising spiral ascent, like ascending an aerial staircase; this it continued for ten minutes, timing it by my watch in hand. Then it reversed the order of its spiral ascent, and continued its upward flight, now only a glimpse of silver could be seen as it turned its breast to the sun. At last, when it looked only like a dot in the sky, I saw it joined by its mate, and quickly both were lost to view. Might not this soaring often be done as a means of ascertaining the whereabouts of its consort? I could not be with the object of procuring food. The haunt of the White-bellied Sea-Eagle, on the opposite page, is reproduced from a photograph I took on the 12th August, 1911.

The usual food of this species consists of various mammals, fish, birds, tortoises, eels and the larger crustacea. It will also occasionally capture and carry off any small domestic animal. On Phillip Island, Western Port Bay, Victoria, in my early collecting days, it used to carry off the young kids of Angora goats. One of these birds I dissected contained portion of a large sea mullet, a piece of wily dead grass, and the remains of undigested portions of fish, scales and fish bones.

Dr. W. Macgillivray has forwarded me the following notes, made by Mr. W. McLennan on the Leichhardt River, Northern Queensland:—"On the 30th June, 1910, I heard a strange bird calling as soon as I woke, so I got the gun and proceeded to investigate; did not succeed in locating the bird; after breakfast went down the river for half a mile, and then went out from the river about one hundred yards, heard the same call, and soon located the bird, a White-bellied Sea-Eagle, sitting beside its nest in a large river Gum; it flew off as I approached, and the mate flew from a tree close by. The nest contained one hard-set egg. The nest itself was very large, and had evidently been used and added to for many years, about six feet in depth and five feet in diameter, egg cavity two feet across by six inches deep, nest composed of sticks and lined with green leaves. The nest was placed in a fork about fifty feet from the ground."

Mr. Frank Hislop writes me as follows from the Bloomfield River, North-eastern Queensland:—"The only White-bellied Sea Eagle's nest I have seen is on one of the Hope Islands, near the Great Barrier Reef. These islands are about eleven miles from the mouth of the Bloomfield River. The nest is built in a large Mangrove, near the edge of the water, in a fork about fifteen or twenty feet from the ground. I have never taken any of their eggs. The birds are not very common about here; the native name for them is 'Wandee.'"

Mr. H. G. Barnard writes me from Bimbi, Duaringa, Queensland:—"In 1880 a pair of eggs of *Haliastur leucogaster* were taken at a small lake on Fairfield Station. The nearest point to the sea, in a direct line, is about one hundred and fifty miles. The nest was built in a large Swamp Gum, about sixty feet from the ground. In company with my brother, Mr. C. A. Barnard, I again visited the lake at the latter end of August, 1882, and found the Eagles had shifted their breeding place to a tree about two hundred yards from where the first nest was; the tree was a very large one, but by dint of hard work and taking it in turns to cut the steps, we managed to reach the nest, only to find it contained two young birds, on which the feathers were just appearing. It was while on this trip, and near the lake, that we first discovered the breeding habits of the Beautiful Parrakeet (*Psephotus pulcherrimus*). I was in hopes of visiting the lake this season (1909), as the White-bellied Sea-Eagles still breed there, but circumstances intervened to prevent me."

Mr. George Savidge has sent me the following notes from Copmanhurst, Upper Clarence District, New South Wales :—“ The White-bellied Sea-Eagle (*Haliaeetus leucogaster*) is sparingly dispersed in pairs in suitable places about the Clarence River District. I have observed it on the sea coast about Yamba, also the swamp lands at the back of Ulmarra, where I took a set of three eggs, and nearly one hundred miles inland at Cangai, and the blacks tell me they know of its nesting site still higher up the river near Tabulan. A pair breeds every year at Broadwater, seven miles below Cangai, and has selected about the most difficult and tallest Gum-tree in the locality for its nesting site. I have taken eggs in May, June and July; its food consists of fish, birds of the larger kind, and tortoises. Under the nests at Cangai were strewn the empty shell of tortoises; the place smelt of them; they were also upon the platform of sticks that form the bulky nest. My friends at Ulmarra have seen this Eagle catch and carry away shot ducks, and upon one occasion it had a great struggle with a full grown goose that was on the water, but did not succeed in killing it. I found a nest of *Haliaeetus leucogaster* on the 24th May, 1897, at Ulmarra, and on the 25th June this yielded a set of three eggs; is not this an unusual number? They are of a dull or dirty white, and smeared in places with light yellowish-brown, and had been sat upon for about a week I found when blowing them.”

Mr. H. L. White, of Belltrees, Scone, New South Wales, has sent me the following note :—“ Mr. Henry Nielson, of Mackay, Queensland, while employed by me collecting during 1909, found upwards of a dozen nests of *Haliaeetus leucogaster*, this species not being so plentiful as *Pandion leucocephalus*, the proportion being about three *Pandion leucocephalus* to one *Haliaeetus leucogaster*. The nests are large stick structures, lined with leaves, and usually placed in trees at varying heights, one being found ten feet up in a small Gum-tree. A nest containing young was found in the grass overhanging a cliff, a few sticks only being placed at the side. Frequently the nest was placed in a tree growing in dense scrub. Unlike *Pandion leucocephalus*, which Mr. Nielson found always selects a broken-topped tree, a whole-topped tree is always chosen. The eggs, two to the clutch, present no variation in colour, but differ very much in shape and size.”

Mr. W. C. Plummer has sent me the following notes :—“ Many years ago some lads and myself were amusing ourselves on Goat Island, one of the beauty spots on the Manning River, New South Wales, and opposite to the town of Taree. This island was covered with a dense growth of brush, in the midst of which towered a giant Gum-tree, on which, I believed, a pair of White-bellied Sea Eagles had their nest. Our attention was suddenly aroused by a squealing sound, and looking up we saw one of the Eagles carrying a sucking pig from the mainland of Taree to the Gum-tree on the island near us, where, no doubt, the Eagles, and perhaps their young ones, soon made a meal of it, but the density of the foliage prevented us following the flight of the bird to the nest, and seeing that part of the performance. I have a distinct recollection that the Eagle seemed to be carrying the pig quite easily, showing the great strength of this bird. Either on the same occasion, or another, on the same island, I saw one of these Eagles pounce on a Flying-fox that was hanging from a tree, and carry it off. I do not recollect that I heard the Flying-fox make any cry or sound whatever, though the noise made by the rush of the Eagle may have prevented my noticing it if it did so.”

Mr. Robt. Grant, Taxidermist of the Australian Museum, has handed me the following note :—“ While collecting with Mr. E. J. Cairn at Bourke, on the Darling River, New South Wales, on behalf of the Trustees of the Australian Museum, we found a pair of White-bellied Sea-Eagles used to frequent a billabong about half a mile from the wool-wash, and which contained numerous fish, some we caught often weighing two and three pounds. Many times we tried to get within shooting range of these birds, but always without success. On another occasion I surprised a pair of White-bellied Sea-Eagles at Byrock, on the Cobar road, near some pools amongst some granite rocks which are covered with Aboriginal drawings, but as usual they rose while out of range. One I could see carried in its talons a fish as it flew away, and finally settled at some distance on a dead tree.”

Mr. Henry F. White, of Glebe Point, Sydney, has sent me the following notes under date 14th June, 1909:—"On several occasions during the last three years, while fishing on the Hawkesbury River at a place called 'Tumble Down,' on the northern shore, about a mile and a half from Brooklyn Railway Station, and where the banks are backed by rocky escarpments rising some two hundred or more feet from the water, I noticed a couple of *Haliaetus leucogaster* quietly soaring high up in the heavens. Apparently they were on the watch for any hapless Catfish (*Cudoglanis megastomus*) we might catch, which are dreaded by all amateur fishermen on account of their poisonous spines. The White-bellied Sea-Eagles would suddenly swoop down and seize the fish in their talons, and soar away out of sight, no doubt to their nests to feed the young. On a very sultry day in November, 1908, I noticed one of these birds seize a Catfish we had caught, about half a pound in weight, in its talons, and it flew a long way a few feet from the water, and seemed unable to rise, but eventually it gradually got higher and higher, until lost to view. On May 30th, 1909, I noticed a pair of these birds flying amongst the trees, making a great noise, but could not see what they were after; and in June last year I noticed a pair in the same place."

Mr. George Masters informs me that when collecting on behalf of the Trustees of the Australian Museum, at Port Lincoln, South Australia, in November, 1865, with a companion he visited Louth Island, lying about five miles off the coast. On arriving there he observed a pair of *Haliaetus leucogaster* circling overhead, but out of range; the island was covered with a short undergrowth, and in parts the abode of countless numbers of Little Penguins (*Endyptula minor*). Later on Mr. Masters discovered the nest built on a cliff, about one hundred feet above, and overhanging the water, containing two half-fledged young. The nest was an immense structure, built of boughs and thin sticks lined with finer material, twelve feet in diameter, the top of it two feet in height from the ground, and had evidently been resorted to for a number of years. In and around it were over two hundred more or less perfect skins of Little Penguins, which had been entirely divested of every particle of flesh by the Sea-Eagles, leaving the skins almost entire.

From Dr. A. Chenery, Port Augusta, I have received the following note:—"On 8th August, 1901, I found down Spencer's Gulf the nest of *Haliaetus leucogaster*, with two fresh eggs in it. The nest was in a Mangrove-tree, on the water's edge, and surrounded with water at high tide. The nest was built of dry Mangrove sticks, lined inside with green Mangrove shoots and leaves, about four feet across and two feet six inches deep; egg cavity one foot six inches across. The height was sixteen feet from the ground."

Mr. Tom Carter writes as follows:—"The White-bellied Sea-Eagle (*Haliaetus leucogaster*) was fairly common about Carnarvon, and more so in the region of the North-west Cape, North-western Australia. In the latter locality the nests were usually built on almost inaccessible ledges of the great gorges in the ranges, but on two occasions I found nests (which had apparently been occupied for many years) built in stunted White Gum trees, only about twelve feet from the ground. The clutch is usually two, the eggs being laid from the third week in June until about the second week in July. I only knew this species to kill sheep on one occasion."

Mr. E. D. Atkinson sent me the following notes from Tasmania:—" *Haliaetus leucogaster* occurs in pairs here and there along our coast, so far as I know it, that is from the South-west Cape eastwardly round to the Pieman Heads on the west coast, and on the adjacent islands. On the coast line, where trees are available, they select the tallest for their nests, but on the islands, and in the absence of large trees, they build on the rocks overlooking the sea. On Walker's Island, West Bass Straits, on the 10th October, 1886, I took two hard set eggs from a high nest of sticks placed on a pinnacle of rocks. There were several old nests in the vicinity in similar positions, some of them of very ancient structure, giving evidence that this place has been the home of these birds for many years. Some years ago, when living in D'Entre-

casteaux Channel, I cut down a tree of medium size on Bruni Island which contained a nest of this species; there were two young birds, one of which was killed by the falling tree, the other I took home and kept for some considerable time. Although it had full liberty, it never offered to go far away, but would fly about my house from tree to tree. When I held out a fish it would swoop down and take it from my hand, and then return to its high perch. Unfortunately, and much to my regret, this bird was shot. I have on more than one occasion known these birds to capture snakes of considerable size. When living at Table Cape, on the north-west coast, I observed a Sea-Eagle flying over my house, which it just cleared, with a Black Snake in its talons which must have been nearly four feet in length. It was making to its nest in a tall Stringybark-tree at the foot of Table Cape, and the reptile was probably for the young bird's supper."

Mr. R. N. Atkinson writes me as follows relative to a visit paid by him and his father, Mr. E. D. Atkinson, to Walker's Islands in the Hunter Group, on the 2nd October, 1905: "The Sea-Eagles also breed on Walker's Island, but we were just too late to take the eggs for ourselves, some 'trappers' having secured them, but they were willing to part with them. The nest was some miles away, and we did not go to it, but we were informed it was a very large structure placed in the side of a high cliff near the sea, the eggs being taken late in September. Another we found on a small rocky island, evidently of this species, was placed on a ledge of rock, but there was only room for an unusually small nest, and the birds had evidently contented themselves with the same for a season; there were no signs of the birds then, and the nest was either a very well preserved one of the previous season, or had not been laid in when we found it."

From notes made by Dr. Lonsdale Holden, while resident at Circular Head, on the north-west coast of Tasmania, I have extracted the following:—"In August, 1885, I saw *Haliastur leucogaster* flying over the rocks on the coast, and near the Sisters Creek, Rocky Cape. About this spot these birds bred in a tree for many years, but the tree is now destroyed. I searched about to find their new home, but without success. It is said pairs breed in lofty trees at intervals of a few miles all along the coast. In January, 1887, I saw one sitting on a telegraph post at Eastern Inlet, Circular Head, and rode within twenty-five yards of it, the bird not moving. I had seen one before on the same post. Looked at sideways in profile, it resembled a large Guinea-fowl from a distance. On the 21st August, 1887, a boatman from Robbins Island told me he was at Walker's Island a few days before, and saw these birds building, carrying sticks to their nest, which was in an inaccessible place on the rocks, but could be reached with a rope. About the 23rd September there was one egg in the nest on Walker's Island, whether incubated or not I do not know, and the nest was half upset as if by the wind, so that the other egg might have fallen out of it. The following month, while riding on the heathy banks east of the Black River, a White-bellied Sea-Eagle slowly winged his way over me, and seemed to be watching my dog hunting bandicoots. It came very close to me, and would have been an easy shot."

From Hobart, Tasmania, Mr. Malcolm Harrison writes me:—"The White-bellied Sea Eagle (*Haliastur leucogaster*) is to be found principally upon the north and east coast line of Tasmania, but is nowhere common. A fine specimen was shot on Franklin Island, at the mouth of the Derwent River, by Mr. Russell Young, Jnr., and I heard of a set of eggs being taken in 1909 on Bruni Island. As a rule the eggs are fairly safe, the nests being placed in the most inaccessible trees, the winning of a pair of eggs from which is no mean feat."

The nest is a large open structure composed of thick sticks, and lined generally with Eucalyptus leaves, when built in trees, and varying in height according to the angle of the fork in which it is formed. It is often placed on a pinnacle of rock or in rocky cliffs, and on low uninhabited islands on the bare ground; in the latter position nests are larger and more

irregularly formed. The nest here figured, built in a large Eucalyptus tree, which I photographed, contained two heavily incubated eggs, and was about sixty feet from the ground. Another nest examined on the same day was in almost a similar position, and one of the birds was flying overhead. The latter structure averaged about five feet in width by three feet in depth, and the climber easily stood up in it. Since examining it a week before, it had been newly lined with Eucalyptus leaves. As a rule the nests when built in trees are well placed out of harm's way, sometimes over one hundred feet from the ground, and frequently in dead and rotten trees, rendering them more inaccessible; occasionally they are built low down in trees twelve to twenty feet from the ground. The nests are added to every season, and some of them are immense structures.



CLIMBING TO A NEST OF THE WHITE-BELLIED SEA-EAGLE.

at Wattamolla, New South Wales, in August, 1870, and August, 1875, measure respectively.—Length (A) 2.72 × 2.06 inches; (B) 2.98 × 2.16 inches. A set of two taken by Mr. W. White,

on Kangaroo Island, South Australia, in August, 1892, measures:—Length (A) 2.76 × 2.17 inches; (B) 2.72 × 2.14 inches. A set of two received from Mr. George Savidge, and taken at Broadwater, on the Upper Clarence River, New South Wales, on the 17th July, 1897, measures:—Length (A) 2.93 × 2.23 inches; (B) 3.25 × 2.24 inches; the former egg of this set is represented on Plate B. XVII., figure 1. A set of two taken on the 2nd October, 1892, by Mr. E. D. Atkinson, on Walker's Island, off the north-western coast of Tasmania, measures:—Length (A) 2.93 × 2.2 inches; (B) 2.93 × 2.22 inches. A set of two taken at Middle Harbour, Sydney, measures:—Length (A) 2.8 × 2.17 inches; (B) 2.82 × 2.2 inches.

Young birds are brown above with brownish-white tips to the feathers, the nape and hind neck tipped or margined with tawny-brown; rump darker brown with larger whitish tips; the longer upper tail-coverts and tail-feathers dull dingy-white, the latter tipped with brown, more largely on the outermost feathers on either side, which are again narrowly edged at the tip with brownish-white; throat buff, remainder of the under surface rufescent-brown with buffy-white centres or tips, paler on the lower breast and

abdomen, where many of the feathers are buffy-white indistinctly mottled with pale rufescent-brown; thighs pale rufescent-brown; under tail-coverts pale buffy-white. Wing of male slightly exceeding that of the adult, 22 inches. Semi-adult birds resemble the adults, but are duller in colour, and have the feathers on the crown of the head, hind neck and fore-neck more or less marked with tawny-brown, and the white feathers of the under parts washed with buff; the upper parts are browner, and the entire tail-feathers are dingy-white with a few indistinct brown mottlings. Some apparently adult birds have the lesser upper wing-coverts margined with white at the tips, and the shafts of the feathers on the crown of the head, nape, hind neck and the breast black.



WHITE-BELLIED SEA-EAGLE (NESTLING).

Mr. Chas. G. Gibson has sent me the following note respecting the photograph of the young White-bellied Sea-Eagle, which is here reproduced:—"White-bellied Sea-Eagles' (*Haliaeetus leucogaster*) nests were noted only on the Wallabi Islands, four or five being seen. Unlike those of the Osprey they were placed on rocky points right at the water's edge; the nests are more roughly made than those of the Osprey, and are not so picturesque. They are composed entirely of sticks and branches of the brush and mangrove growing on the islands, and contain none of the odds and ends so characteristic of the Osprey's nests. Nests are almost flat on top, and no 'lining' of any description is used. In every case, except one, the young birds (one or two) were able to fly from the nests. In the photograph a single young bird occupied the new nest, which was built beside the old one. It was taken on East Wallabi Island, 17th November, 1907."

The breeding season varies in the different States, Mr. H. G. Barnard taking eggs in Queensland in June, and Mr. G. Savidge in June and July in Northern New South Wales. Near Sydney eggs have been taken in August, and the late Mr. Ralph Hargraves also obtained them in the same month, in the southern part of the State. In North-western Australia Mr. Tom Carter took several sets of eggs in July, and on one of the Wallabi Islands, Houtmann's

Abrolhos, Western Australia, Mr. C. G. Gibson found these nests containing young birds in November, and in the same month I saw a nest on Phillip Island, Western Port Bay, Victoria, also containing young. At the head of Spencer's Gulf, in South Australia, Dr. A. Chenery took eggs in August, as did also Mr. W. White, on Kangaroo Island; and on Walker's Island, off the north-west coast of Tasmania, Mr. E. D. Atkinson took eggs in October. From the time the birds start to re-line their nest, deposit the eggs, hatch the young birds, and the latter leave the nest, a period of four months elapses.

Genus HALIASTUR, *Selby*.

Maliastur girrenera.

RUFIOUS-BACKED SEA-EAGLE.

Haliastur girrenera, Vieill. and Oudal., Gal. Ois., Tom. I., pl. X (1825); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 315 (1874); *id.*, Hand-l. Bds., Vol. I., p. 268 (1899).

Haliastur leucosternus, Gould, Bds. Austr., fol. Vol. I., pl. IV. (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 17 (1865).

ADULT MALE.—*The entire head, neck, chest and breast pure white; the remainder of the plumage rufous-chestnut; the tips of all but the outermost tail-feathers on either side whitish; the apical portion of the five outermost primaries black; bill light horn colour, head colour at the base; legs and feet light yellow. Total length 18 inches, wing 15, tail 7.8, bill 1.2, tarsus 2.15.*

ADULT FEMALE.—*Similar in plumage to the male. Wing 15.3 inches.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales.

AS both species of Sea-Eagle inhabiting Australia are white-headed and white-breasted, I have discarded the latter vernacular name applied by Gould to the present species in favour of the more distinguishing and appropriate name of Rufous-backed Sea-Eagle. It is somewhat remarkable that its very close ally, *Haliastur indus*, of India, is vernacularly known as the Brahminy Kite, while Dr. E. P. Ramsay, in his "Catalogue of Australian Accipitres,"* refers to *Haliastur girrenera* as the Red-backed Fish-Eagle, under which are the following remarks:—"In some specimens the primary coverts above, nearest the margin of the shoulders, have a black shaft-stripe and remains of black cross-bars, the latter also are noticeable on the inner webs of some of the inner primaries and inner secondaries, and on the tail-feathers. The plumes covering the flanks, and the feathers at the upper joint of the thighs also, are occasionally white, as well as the small feathers at the base of the scapulars; the smaller scapulars have occasionally black shaft-lines, and also transverse bars of black on their concealed portions; basal portions white. These facts will assist in bearing out Mr. Sharpe's opinion, with which I entirely coincide, that the Australian bird (*Haliastur girrenera*) cannot be admitted to hold full specific rank, but with *Haliastur intermedius* (Gurney) must be considered a fixed variety of the Indian Fish-Hawk (*Haliastur indus*)."

Haliastur girrenera has a wide ultra-Australian range, and is also found in favourable situations on the north-western, northern and eastern coast of Australia. Mr. Tom Carter informs me it was common in the summer months at Point Cloates, North-western Australia, both on the coast and for a distance of twenty-five miles inland, and he had picked up several of these birds dead that had taken poisoned baits laid for wild dogs. The late Mr. T. H. Bowyer-Bower, and Mr. E. J. Cairn, obtained specimens in the mangroves near Derby, and

* Aus. Mus. Cat. Accip., p. 35 (1876).

Mr. G. A. Keartland observed this species at the junction of the Fitzroy and Margaret Rivers, one hundred and fifty miles inland. Gilbert met with it at Port Essington, in the Northern Territory of South Australia, where he found it breeding; and it is common on the northern and eastern coasts of Queensland, the late Mr. J. A. Thorpe procuring specimens at Cape York, in the extreme northern part, and also at Fraser's Island, near the southern boundary of that State. In intermediate localities Mr. E. A. C. Olive has obtained it at Cooktown. Mr. Frank Hislop found it breeding on the Bloomfield River, Messrs. Cairn and Grant observed it near Cairns, and the late Mr. J. Rainbird obtained birds, nests and eggs at Port Denison. In New South Wales I observed it at the entrance of the Tweed River Heads, Dr. E. P. Ramsay procured specimens at the Richmond River, Mr. G. Savidge noted it at the Clarence River Heads, Mr. R. Grant met with it at the Bellinger River Heads, and Lewin shot one in 1801 on the Lower Hunter River, where Gould also observed a single example many years later; this is the furthest south I have known this species to occur.

From the Bloomfield River, North-eastern Queensland, Mr. Frank Hislop sends me the following note:—"The White-breasted Sea-Eagle sometimes builds on the same tree in which the Shining Calornis have their nests. The two nests I saw were both in the scrub, in very tall trees; one a White Pine, about half a mile from our home, 'Wyalla.' Both nests were about four or five miles from the sea coast. The Aboriginal name for the species is 'Carparra.'"

I have made the following extracts from Mr. E. J. Banfield's interesting work* when referring to the fauna of Dunk Island, lying off the coast of North-eastern Queensland, to the north of Kennedy Bay, and which for many years past he has preserved as a bird sanctuary:—All the forest brood do not plot mutual slaughter. Some live in strict amity. Here on this Moreton Bay Ash, taken advantage of (as a nesting tree) by the Shining Calornis, a White-headed Rufous-backed Sea-Eagle nests, and the graceful fierce looking pair come and go among the glittering noisy throng without exciting any special comment. Now the White-headed Sea-Eagle, with its sharp incurved beak, terrible talons, and armour-plated legs, is a friend to all the little birds. They know and respect and almost venerate him. A horde of them never seeks to scare him away with angry scolding and fierce assault, as it does the cruel Falcon and the daring Goshawk. Domestic fowls learn of his ways, and are wise in their fearlessness of him. But I was not well assured of the reason for the trustfulness and admiration of the smaller birds for the fierce-looking fellow, who spends most of his time fishing, until direct and conclusive evidence was forthcoming. Two days of rough weather, and the blue bay had become discoloured with mud churned up by the sea, and the Eagle found fishing poor and unremunerative sport. Even his keen eyesight could not distinguish in the mucky water the coming and going of the fish. Just near the house is a small area of partly cleared flat, and there we saw the brave fellow roaming and swooping about with more than usual interest in the affairs of dry land. At this time of year green snakes are fairly plentiful. Harmless and handsome they prey upon small birds and frogs, and the Eagle had abandoned his patrol of the sad-hued water to take toll of the snakes. After a graceful swoop down to the tips of a low-growing bush, he alighted on the dead branch of a Bloodwood, one hundred and fifty yards or so away, and, with the help of a telescope his occupation was revealed, he was greedily tearing to pieces a wriggling snake, gulping it in three quarter yard lengths. Here was the reason for the trustfulness and respect of the little birds. The Eagle was destroying the chief bugbear of their existence, the sneaking greeny-yellow murderer of their kind, and eater of their eggs, whose colour and form so harmonise with leaves and thin branches, that he constantly evades the sharpest-eyed of them all, and squeezes out their lives and swallows them whole. But the big red detective could see the vile thing fifty and even one hundred yards away, and once seen—well one enemy the less. In five minutes a slight jerk of the neck indicated a successful observation, and he soared out, wheeled like a flash,

* Confessions of a Beachcomber, pp. 109-113 (1908).

and half turning on his side, hurtled down in the foliage of a tall Wattle, and back again to his perch. Another snake was crumpled up in his talons, and he devoured it in writhing twisting pieces. Within ten minutes the performance was repeated for the third time, and then either the supply of snakes ran out, or the bird was satisfied. The White-headed Sea-Eagle is a deadly foe to the pugnacious Sea-serpent also. On the beach just above high water mark, was the headless carcase of one that must have been fully five feet long, and while it was under inspection an Eagle circled about anxiously. Soon after the intruders disappeared the bird swooped down and resumed his feasting, and presently his mate came sailing along to join him. The snake must have weighed several pounds, and apparently was not so dainty to the taste as the green arboreal variety, for after two days' occasional feasting, there was still some of the flesh left.

Unbecoming as it may be to tantalise by trickery so regal a bird, a series of trials was undertaken to ascertain the height from the surface whence a fish could be gripped. Twelve successive swoops for a mullet flopping on the sand failed, though it was touched at least six times with the tips of the Eagle's outstretched talons. Consummatory to failure, the bird was compelled to alight undignifiedly a few yards away, to awkwardly jump to the fish, and to eat it on the spot, for however imperious the Sea-Eagle is in the air, and dexterous in the seizure of a fish from the water, he cannot rise from an unimpressionable plane with his talons full. On another occasion a fish was raised four inches on a slender stake. The Sea-Eagle dislodged it several times, but could not grasp it. Raised a further four inches the fish was seized with fumbling. Eight inches or so, therefore, seems to be the minimum height from which a bird with six feet of red wing, and a nice determination not to bruise or soil the tips, may grasp with certainty.

Mr. Robert Grant, Taxidermist of the Australian Museum, has handed me the following notes:—"During our second trip to North-eastern Queensland, Mr. E. J. Cairn and myself were compelled through monsoonal rains to camp near Cairns. We had, therefore, an opportunity of seeing and shooting many Rufous-backed Fish-Eagles (*Haliaastur girrenera*), as they were very numerous in the Mangroves about the mud-flats around the bay. As the tide went out nearly half a mile, and left exposed many hundreds of dead or dying fish on these evil smelling and sweltering mud flats, it was a perfect paradise for these Fish-Eagles; however, as the feathers were much abraded, and their plumage soiled, of the many we shot there was not one worth keeping to prepare as a specimen. On another occasion, when collecting at the Bellinger River Heads, I had the pleasure of seeing for the first time there a pair of Rufous-backed Fish-Eagles in New South Wales. I exerted myself on two or three occasions to try and get a shot at them, but without success, as their roosting place appeared to be in a part of the Mangroves I found it entirely impossible to penetrate."

The following information was received on the 24th October, 1909, from Mr. Henry L. White, of Belltrees, Scone, New South Wales, and was extracted by him from notes made by Mr. Henry Nielson, of Mackay, Queensland, during a collecting trip for Mr. White in 1909:—"A strip of the Queensland coast between the 20th and 23rd parallels of south latitude has been very thoroughly examined, and a distance of fifteen hundred miles sailed, from 1st May to the end of September, 1909. A large number of White-breasted Sea-Eagles (*Haliaastur girrenera*) were seen, and many nests noted. The birds appear to feed principally upon crabs, obtained on the mud flats. The nest is usually placed in a Mangrove tree (growing on the mud flats bordering salt water creeks), at various heights, some nests being found a few feet only above high water mark. The structure varies considerably in size, and is composed of dead sticks; the egg cavity, which usually measures about six inches across and shallow, is lined with coarse pieces of bark, and at times thickly coated with mud, evidently collected and deposited by the birds' feet. Old nests have been seen with plants growing from the mud lining. After eggs

have been taken another nest is usually built, but in one case the second clutch was laid three weeks and five days after the first clutch was secured. Upwards of thirty nests were examined, the number of eggs to the clutch being as often one as two; in almost every case the eggs were much stained by mud, clean fresh looking clutches being rare. The breeding months are August, September and October. Mr. Nielson reports that when watching a Jabiru (*Xenorhynchus asiaticus*) feeding in shallow water, the bird caught a fair sized fish, which was rather too large to swallow hurriedly. Two White-breasted Sea-Eagles, who were evidently upon the lookout, immediately attacked the Jabiru, and worried it considerably until the fish was swallowed."

Mr. George Savidge sends me the following notes from Copmanhurst, New South Wales:—"I have not had much opportunity of observing the habits of *Haliastur girrenera*, but there is one pair always about Yamba Bay, Clarence River Heads. I have seen them after the fishermen have hauled their nets come to the place and pick up and carry away the small fish sometimes left there. One pair came regularly nearly every morning, and perched on a high piece of jutting rock quite close to our house; the rock formed part of the retaining wall there. The fisherman whom I mentioned the fact to told me these birds often take away any fish left about, and even take the fish from the nets, which are left for a few hours, the fishermen often coming home before daylight, and their nets bundled ashore, to be hung up later on. I was shown fish with their claw marks quite plain on them. No person at Yamba as far as I could ascertain knows their breeding place, but they seem very tame, and the fisherman said they were quite a nuisance to him. During one of our dry seasons, in 1902 I think, a pair resided about Copmanhurst Wharf for several months during the winter time; they were living principally upon the garfish which came up that year in very large shoals. This pair of birds remained so long I was in hopes they would breed, but as spring came they disappeared. Their backs are a beautiful chestnut-red when they wheel about, and the sun shines upon them."

Mr. G. A. Keartland, of Melbourne, Victoria, has sent me the following notes:—"The White-breasted Sea-Eagle (*Haliastur girrenera*) was frequently seen on the Fitzroy River, near its junction with the Margaret River, about one hundred and fifty miles inland from King's Sound, in North-western Australia. These birds were either perched on the topmost branches of the highest trees, or flying slowly near the surface of the water. The Aborigines assert that whilst perched they are either resting or looking for some unwary fish basking in the sunshine. Having discovered their intended victim, they fly close to the water and seize the fish as they pass over it. They construct large stick nests in the high trees on the margin of the Fitzroy River."

From Broome Hill, South-western Australia, Mr. Tom Carter writes:—"The White-headed Sea-Eagle (*Haliastur girrenera*) was fairly abundant in North-western Australia from the North-west Cape and Exmouth Gulf northwards, especially where large areas of Mangroves grow. I have seen odd birds as far as twenty-five miles inland, on a flooded White Gum flat. They are not seen much from August to November, when they doubtless retire to the dense Mangroves to breed. I found one nest near the North-west Cape, built in the Mangroves. It was not much larger than a Crow's nest, and the ground below was littered with claws and bits of shell of the yellow land crab, on which these birds largely feed. On several occasions I have picked up birds that had died from eating poisoned baits laid for wild dogs."

Gould remarks:—"This species, says Gilbert in his notes from Port Essington, is pretty generally spread throughout the peninsula and the neighbouring islands, and may be said to be tolerably abundant. It breeds from the beginning of July to the end of August. I succeeded in finding two nests, each of which contained two eggs; but I am told three are sometimes found. The nest is formed of sticks, with fine twigs or coarse grass as a lining; it is about two feet in

diameter, and built in a strong fork of the dead part of a tree; both of those I found were about twenty feet from the ground, and about two hundred yards from the beach."

Dr. E. P. Ramsay writes:†—"In almost every instance the nests found by Mr. J. Rainbird were placed near the tops of the larger trees, in belts of Mangroves skirting the edges of salt-water swamps and marshes in the neighbourhood of Port Denison. They were composed of twigs and dead branches of Mangroves, lined with a finer material. One, from which that gentleman shot the bird, and brought me the eggs upon which she was sitting, was lined with tufts of lichen; and in this instance the eggs were placed on various fish-bones, shells and claws of crabs, &c.; the edges and sides were beautifully ornamented with long streamers of bleached seaweed, which gave the nest a novel and pleasing appearance."

One or two eggs are laid for a sitting, varying from oval to rounded-oval in form, the shell being coarse-grained, lustreless and of a dull white or bluish-white ground colour, and having fine streaks, scratches, and short wavy hair lines of chestnut or brown; in others the markings consist of irregular shaped dots, spots and blotches of rich umber-brown, intermingled with a few short streaks, scratches or smears of a paler hue; as a rule they are confined chiefly to the larger end of the shell; some are almost devoid of markings, with the exception of a few almost invisible spots of pale brown. A set of two in the Australian Museum Collection, taken by the late Mr. J. Rainbird at Port Denison, Queensland, in 1863, are rounded ovals in form, dull white, with a few indistinct spots and smears of yellowish-brown, principally on the larger end. Length (A) 1.97 × 1.58 inches; (B) 1.99 × 1.63 inches. Of two sets collected by Mr. H. Nielson, one set obtained at Cape Palmerston Inlet, south of Mackay, on the east coast of Queensland, on the 9th September, 1909, from a nest placed on a low Mangrove, only two feet above high water mark, measures:—Length (A) 2.07 × 1.65 inches; (B) 1.97 × 1.44 inches. Another set of two taken by him from a nest built twenty feet up in a Red Mangrove on Waverley Creek, Broad Sound, near St. Lawrence, Eastern Queensland, on the 16th September, 1909, measures:—Length (A) 2.14 × 1.67 inches; (B) 2.1 × 1.58 inches. The former set, which has been washed, are dull white and have small indistinct dots and spots of faint red and yellowish-brown distributed uniformly over the surface of the shell, except on the smaller end of one; the latter has the dull white shell more or less soiled all over, apparently with the muddy feet of the sitting bird. A set of two taken on the Daly River, in the Northern Territory of South Australia, on the 4th May, 1902, measures:—Length (A) 2.1 × 1.66 inches; (B) 2.1 × 1.62 inches. An egg, the only one in the nest, in Mr. George Savidge's collection, taken near Cooktown, measures:—2.18 × 1.63 inches. Some varieties of the eggs of this species are not unlike the eggs of the Whistling Eagle (*Haliaeetus spheerulus*).

In Northern Australia this species is an early breeder, the nesting season commencing at the latter end of April, or early in May, and continuing until the end of September. In Eastern Queensland, as may be gleaned from Mr. H. Nielson's notes, it is from August until the end of October.

Maliastur spheerulus.

WHISTLING EAGLE.

Milvus spheerulus, Vieill., Nouv. Dict. d'Hist. Nat., Tom. XX., p. 564 (1818).

Haliaeetus spheerulus, Gould, Bds. Austr., fol. Vol. I., pl. 5 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 20 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 316 (1874); *id.*, Hand-l. Bds., Vol. I., p. 268 (1899).

ADULT MALE.—General colour above brown washed with fulvous, the feathers of the head and hind neck rufous in the centre, and having black shaft lines, as have also the scapulars and feathers

† Ibis, 1865, p. 83.

of the mantle, quills dark brown, the upper wing-coverts paler, the lesser coverts with rufous-brown tips, upper tail-coverts and tail-feathers ashy-brown, the latter with the remains of broken brown cross-bars, which are more distinct on the inner web; all the under surface dull fulvous-white, mottled irregularly or streaked with brown, and having blackish shaft lines to most of the feathers; the thighs and under tail-coverts more uniform whitish, the latter exhibiting the remains of broken brown cross-bars; bill and cere greyish-brown colour; legs and feet greyish-white; iris blackish-brown. Total length in the flesh 21 inches, wing 16, tail 10.5, bill 1.3, tarsus 2.4.

ADULT FEMALE.—*Similar in plumage to the male, but slightly larger. Wing 16.5 inches.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

IN addition to its wide ultra-Australian range, the Whistling Eagle is found in favourable situations over the greater portion of the Australian continent, and is far more abundantly distributed inland than it is near the coast. It is needless to here recapitulate the many collectors who have obtained, or observed it, in all the States of the continent; it will suffice to add that examples occur in nearly every important collection made inland, and also in many made in coastal districts. Occasionally it occurs in the County of Cumberland. I have seen it and heard its well known notes at Dobroyde and Narrabeen, and there are specimens in the Australian Museum Collection, procured by Dr. E. P. Ramsay at Kingswood, near the Nepean River, by Mr. H. F. Slocombe at Glenfield, twenty-six miles south of Sydney, and by the late Mr. Henry Newcombe at Randwick. Dr. C. A. Edwards obtained one at Waverley, and one received alive from Mr. Edward White was captured by him in his pigeon house at Paddington, which suburb is adjacent to Sydney. It is, however, of rare occurrence near the city, and quite different from Gould's time, who wrote of this species in his "Handbook to the Birds of Australia:—"* "It is incessantly hovering over the harbours, and sides of rivers and lagoons, for any floating animal substance that may present itself on the surface of the water, or be cast on the banks; and when I visited the colony in 1839 it was nowhere more common, or more generally to be seen, than over the harbour of Port Jackson." Direct evidence of it being once a more common bird in the vicinity of Sydney, is afforded by an adult male and two females in the Australian Museum Collection, procured by Mr. George Masters at Dobroyde, five miles from the city, on the 22nd June, 1864.

There is not a great variation in colour of adult specimens obtained in different parts of the continent, but all have the under parts more mottled or streaked, and less uniform, than is shown in Gould's figure of the adult of this species in his "Birds of Australia." Far more young or immature specimens, however, are obtained than adults, the latter having the feathers of the head fulvous-white streaked with brownish-white, the back and upper wing-coverts brown, the former streaked with white and the latter with whitish spots at their tips; on the under surface they are fulvous-white, with the feathers of the foreneck, breast and abdomen margined with brown at the sides, giving the under parts a distinctly streaked appearance; the thighs are whitish, mottled or streaked with light brown.

It usually frequents the timber on the margins of rivers, creeks or marshes, or growing on the plains, or open forest lands. In the breeding season it is generally seen in pairs, but at other times often assembles in immense flocks, and is probably more common in the Central Districts of New South Wales than elsewhere.

The note is a loud whistling cry, resembling "chu chu chu chu chu," rapidly repeated several times, and when once heard can be easily distinguished from that of any other of the Australian Accipitres. Although uttered during the day, it may frequently be heard just about dusk, and again occasionally through the night.

* Handbk. Bds Austr., p. 20 (1845)

The food of this species usually consists of small mammals, birds, reptiles, fish, various kinds of insects and their larva, crustaceans, and it does not hesitate to chase and capture pigeons, poultry and the acclimatised rabbit. It is also a carrion feeder and useful scavenger about killing yards.

From Cobborah Station, Cobborah, New South Wales, Mr. Thos. P. Austin kindly sent me the following interesting and instructive notes:—"Just before *Haliaastur sphenurus* begins



NEST OF WHISTLING EAGLE (IN SITU).

nesting in its normal breeding season, it will often congregate in very large flocks, more often near water, a shallow swamp being a favourite place. I once counted fifty-two birds flying practically in a flock, just soaring round and round over a few acres. Upon another occasion I saw twenty of these birds fly from a Red Gum tree growing by itself on the edge of a swamp, and there were many others flying about. Sometimes these assemblies will be kept up off and on for two or three weeks, and their loud whistling cries may be heard the whole day long. After these congregations are broken up (which is not always done suddenly) a great many of the birds are seen in pairs; this is the time I notice they whistle most. A pair of birds having decided upon a nesting tree, and not having commenced building, will whistle at irregular intervals throughout the day. I find they vary very considerably in the time they take to build their nests; in the majority of cases where they build a new nest, they take as near as I can judge about a month from the commence-

ment until the first egg is laid; but when a pair of birds occupy a previous season's nest, they at times take much longer to build it up again. Why this is I have not been able to discover, unless it is that they take possession of the nest they used the year previous long before they have any intention of laying, simply to prevent other birds from using it. One instance in particular, which came under my notice during 1909, is perhaps worthy of mention. About the end of April I several times saw a pair of Whistling Eagles standing

on the side of a nest which had been built the previous season; this sort of thing continued until towards the end of August. In the meantime a pair of Ravens built their nest in the same tree, from which I took five eggs on August 17th. Shortly after this I was busy with the shearing for a few weeks, after which, while riding past the tree, I saw two young Whistling Eagles sitting upon the Ravens' nest, and the old Eagles' nest was not used at all during that season. I find that the birds on the whole vary as much in their habits as they do in their plumage at various ages. They are extremely erratic in the time they commence breeding, although strictly speaking they practically breed the whole year, but still they have what might be called their proper nesting season. During 1907 I took the first set of eggs on July 10th, 1908 April 13th, 1909 May 18th, and 1910 March 5th. Their breeding appears to be governed by the amount of food there is for them; for instance, during 1907 all the rabbit destruction here was done with phosphorus, and most of the rabbits died in their burrows, and the Eagles could not get them, so food was scarce, and I only took four sets of their eggs during the whole year. During 1908 we had a very serious drought, and heavy losses in stock all through the winter, consequently there was plenty of food for the Eagles, and I took thirty-two sets of their eggs. During 1909 I used strychnine to poison the rabbits, and spring traps for the first time; again there was a plentiful supply of food, and I took thirty sets of their eggs. In 1910 I again used strychnine and spring traps, and being a cool summer I commenced rabbit destruction at the beginning of the year. The result was this species commenced nesting earlier than I have ever known before, and I took thirty-five sets of their eggs. It is a most extraordinary thing that during the first six and a half years I lived here (from June 1900 to the end of 1906) as far as my recollection goes, I did not see more than half a dozen nests, in fact the birds were not here in anything like such numbers as they have been during the three last years. Some of their nests which have been in use, and added to for the last three years, and sometimes two or three times in the same season, are now immense structures, but when a nest is just built, and in use for the first time, it is rather a small nest for so large a bird, and very roughly put together. The lining consists usually of only a few green Eucalyptus leaves, which by the time the eggs are hatched, have worked down to a very small space in the centre of the nest, consequently it is about as uncomfortable a cradle for such a helpless young bird as one could imagine. One extraordinary nest which came under my notice was built about seventy-five feet from the ground, in a large Yellow Box-tree; the nest was one of the largest I have ever seen, and was constructed of sticks and dead rabbits, not just the remains of a few dead rabbits on top of the nest, but from the commencement to the finished whole rabbits had been used, and the legs and heads were projecting from the sticks on all sides of the nest. I have seen their nests built at various heights from the ground, from ten feet to ninety-three feet, in this district the lowest nest I found was twenty-three feet, but the most of them are from sixty to eighty feet high, and usually very difficult to climb to, and in most cases I have had to use a scoop to get the eggs. In the Bourke District, where the timber is mostly small, I have seen their nests in great numbers (although most of them had finished breeding, being late in the year) in the Coolibah trees, two of them were ten and twelve feet from the ground, very few more than fifty feet, and the majority could be climbed to by almost any small school boy. In the Cobbora District I should say about thirty per cent. of the nests used are old Ravens; these they appear to have a great inclination for, and will often take possession of one almost immediately the Ravens have left it. I killed four young Ravens in a nest on August 6th, 1909; twenty days later I took a set of two eggs of *H. sphenurus*, and this is not the only instance of such an occurrence. They usually build in a tree in the vicinity of water, such as Red Gums along rivers, or Coolibahs around a swamp, but in the Armatree District I noticed most of their nests were placed near the top of large Pine trees. I have never yet known them to build in an Ironbark-tree, although there are thousands of acres of Ironbark country just outside my boundary, and some of the trees are very large, and are favourite nesting trees with *Uroctus audax*. On the whole I find them a

very tame bird, appearing to have little fear of man, and will often sit perfectly quiet, perched upon the branch of a tree, at no great height from the ground, while men rode beneath. If approached while sitting, they usually fly from the nest when one is anything within two hundred yards from the tree in which the nest is built: sometimes, although rarely, they will not leave the nest at all as people pass beneath. Although I have taken one hundred sets of their eggs, and climbed to many nests with young, I have only once known this species to show fight, that was while scooping a pair of eggs eighty feet up in a large Red Gum, the Eagle several times made a bold dash at the scoop, and I believe would have taken it in her claws had I not ducked it just in time. Their food consists principally of rabbits (in these parts), and yet I have never seen them kill one themselves, and I very much doubt if they ever do so, excepting they might occasionally take a very young one. Many of their old nests have the remains of rabbits in them. The food which I think they prefer to all others is the ground 'Iguana' or Lace Lizard (*Tarantula varius*). I have several times seen about half a dozen making a meal of



NEST AND EGGS OF WHISTLING EAGLE

one of these reptiles, but I very much doubt if they killed it themselves. Usually they lay only two eggs, but of the hundred sets of their eggs which I have taken thirteen were clutches of three, and once I climbed to a nest in which there were three young. When they lay only two eggs it is mostly on successive

days, yet I have known the interval of a fortnight between, but from the little experience I have had with clutches of three eggs I fancy there is very often an interval of a few days between the laying of each egg."

Writing from Cobborah Station on the 30th June, 1911, Mr. Austin remarks:—"I have not been bothering much about the nests of the Whistling Eagle this year, so did not know where to get a good photograph, but after hunting for four mornings I could only find five pairs of birds breeding, and four of these nests had young, and they were built in such terrible places it was almost impossible to get a photograph of them. The only one with eggs I could find was built by the Whistling Eagles themselves two years ago, and not by Ravens. You will see by the enclosed photograph it was not an easy one to reach. I might say I had a good look at it each of the last four mornings, and it was only as a last hope that I tackled it. The nest was just about eighty feet from the ground, and was in a very awkward position to get at, to say nothing about getting the nest down. However, this is the best I can do at present; one photograph shows the nest in the Red Gum tree in its natural position, the other is taken on the ground after lowering the nest down with a rope. Speaking from memory, the measurement

of the nest would be about twenty-four inches across the top, depth about fifteen inches, and egg cavity about three inches. This was an average sized one for this district."

While on a visit to Cobborah Station in October, 1900, Mr. Austin kindly pointed out many Whistling Eagles' nests to me. At that time the birds were all paired up and breeding, and were not seen in the large flocks referred to by him. Most of the nests were found about or near the banks of the Talbragar River, although some were seen in the open paddocks and



NEST OF WHISTLING EAGLE.

on river flats, and a few on the higher land quite remote from water. Some nests were in the same tree or in trees near to one another; others were wide apart, and an examination of all was made by driving in a sulky to different parts of the estate, a rope ladder, tomahawk, store boxes and camera completing our outfit. In the examination of all nests that required climbing to, Mr. Austin relied almost entirely on the tomahawk, using the rope-ladder chiefly on dead trees, which would save a lot of labour, instead of having to cut a number of steps in the hard wood. Many nests were seen, and several were examined during my stay, my host informing me that one third of the Whistling Eagles did not construct nests them-

selves, but used the deserted tenements of the Ravens (*Corone australis*). On the 11th October he climbed to the vicinity of a nest in the lateral upright branch of a Red Gum tree on the banks of the Talbragar River, and about seventy-five feet from the ground, from which he successfully scooped two half incubated eggs; a pair of Spotted-sided Finches (*Stagonopleura guttata*) were engaged in constructing their grass-formed nest among the sticks beneath the nest of the Whistling Eagle, while he was taking the eggs. The sitting bird flew off the nest on our approach, and did not return while we were at the tree. On the following day Mr. Austin climbed a tree well away

from the river, to another nest about fifty feet from the ground, containing a nearly fledged young one, which he lowered to the ground with a fishing line, and I photographed it, the old birds circling high in the air in the meantime, but not venturing near the nest. Mr. Austin on the 13th October chopped steps for some distance in the trunk of a Red Gum, and after climbing some distance further, scooped one egg from another nest of the Whistling Eagle, about forty-five feet from the ground, and afterwards climbed right to the nest and found the other egg among the sticks, and away from the Gum leaves with which the centre of the structure was lined. Only one bird was seen which sat for some time on a neighbouring tree during our stay at the Red Gum; the eggs were about half incubated.

Of the Whistling Eagles' nests examined by Mr. Austin on the 18th October, one he climbed to in a lateral forked branch of a Yellow Box about seventy-five feet from the ground, contained a recently hatched young one and a chipped egg, also portion of a freshly killed rabbit. Both birds were seen at this nest circling around, and uttering notes of distress resembling those of the Silver Gull (*Larus novæ-hollandiæ*), and one bird, apparently the female, perched open-mouthed a few feet away from the nest. During flight the dark quills show out in contrast to the light under parts of the body, tail and under wing-coverts; it is a clear sailing movement, with seldom any apparent motion of the wings. Two fresh Whistling Eagles eggs were taken from a Raven's nest in a tree the same afternoon, and from which previously that season Mr. Austin had taken three sets of Raven's eggs. Underneath the nest he also obtained a nest of the Spotted-sided Finch containing four fresh eggs. This pair of Whistling Eagles acted in a similar manner to the previous ones, emitting gull-like screams in addition to the whistling notes. We saw no remains excepting an occasional rabbit-skin beneath the nests of the Whistling Eagles examined, nor did we see them attempt to capture any prey. Nothing was found on the ground beneath the nests of this species beyond fragments of rabbit skins, nor was there anything to indicate, in the way of fallen sticks, that there was a nest above in the tree. These birds allow of a close approach, seldom taking flight until one is beneath the tree, or at least within easy range.

Mr. George Savidge writes me from Copmanhurst, New South Wales:—"The Whistling Eagle (*Haliastur sphenurus*) is plentiful in most parts of the Clarence River District, becoming scarcer as the swamp lands are left, and the forest and scrub lands of the Upper Clarence are reached. I have found its nest, and taken its eggs, upon several occasions, two eggs being the number always found by me for a sitting. It preys upon larger birds, poultry included, and small mammals; about the swampy lands Coots and Redbills, &c., are its principal food."

During my stay in the Clarence River District, on the 6th November, 1898, in company with Mr. Savidge and his son, I watched an Aboriginal climb to a nest of this species built in a lofty Grey Gum overhanging the Clarence River, and near the junction of the Orara River. The nest was at an altitude of one hundred and twenty feet, and was reached by means of a rope ladder and a tomahawk. A stiff gale was blowing at the time, and the Aboriginal laid along the limb for a considerable time before he ventured out to the nest, an hour and a half elapsing from the time he ascended the tree until he had secured the eggs and reached the ground again. The nest, which contained two fresh eggs, was a large open structure outwardly formed of sticks and lined with Eucalyptus leaves. The pair of birds kept soaring around in sight during the greater part of the time we were at the tree.

The late Mr. K. H. Bennett wrote from the Mossiel District, New South Wales:—" *Haliastur sphenurus*, though by no means common, is very widely distributed, being met with on the open plains as well as in the timbered country. Its prey consists of small mammals, the young of various birds and reptiles; it is very destructive to rabbits. In Victoria this species used to utter a peculiar shrill whistle; here it is quite silent. The nest is a rather large structure composed of sticks, lined with a few green Eucalyptus leaves, and is generally placed in some forked horizontal branch at a considerable height from the ground. It breeds in this locality

about the middle of September, and the young, usually two in number, leave the nest at the end of December. At Yandembah Station, in the Lachlan District, I found a nest of *Haliastur sphenurus* on the 25th August, 1890, containing two young ones able to fly. It was a most unusual time of the year, for as a rule these birds do not commence nesting in this locality until this month. On the 22nd September following I took two more eggs out of this nest, also two eggs from a nest of *Milvus affinis*. Strange to say the eggs of the latter were larger than those of *Haliastur sphenurus*."

Dr. W. Macgillivray writes me as follows from Broken Hill, in South-western New South Wales:—" *Haliastur sphenurus* is freely dispersed throughout the district, breeding along all the creeks and around the lakes, and Box flats of the scrub country. The general food of this fine bird is the rabbit. The remains of this animal are to be found around every nest containing young, and on all feeding platforms. This bird, when the Darling River is in flood, and the muddy water forces the fish to swim near the surface, has frequently been noticed to swoop down and pick them up with its claws, a habit which has earned it the name of 'Fish-Hawk,' bestowed upon it by those that live along the river; this habit must be regarded as an interesting instance of reversion. The nest is a large stick-built structure placed high up, but always on a strong limb or fork, and is reverted to year after year by the bird, who relines it with green Gum leaves before laying. It is not built up so much as that of the Little Eagle, presenting a flatter and more compact appearance. The nests of the White-face, Chestnut-eared Finch and Yellow-rumped Acanthiza are frequently found built under this Eagle's nest, and often occupied at the same time. The shrill whistling note is uttered when perched on a tree, or when soaring high in the air. The nesting time is September and the early part of October. I have only one record of eggs in August. The clutch is invariably two, rarely three. I have two records of three being taken during nine years collecting in this district. Built into several nests on Yalcowinna Creek last year were the remains of Crows. I had an idea that it was intended to act as a scare-crow, to keep those audacious thieves away from the eggs. Being a season of drought and dead sheep, crows were consequently plentiful, and as it had not been observed before or since it seemed more than a mere coincidence.

"Several old nests were in the Gums along a creek, and during June and July the birds were often flushed from them. They evidently found them a much more comfortable resting place and less exposed to the intensely cold winds that prevail here at this time of the year than a bare branch. No attempt has yet been made to renew the nests. These birds were often seen during the winter months along the creeks and out in the open. On 30th September, 1901, I visited a nest which had been guarded by a pair of birds for a month past, and found that the nest, which was rather flat and platform like, had been built up round the sides with fresh twigs, and the egg cavity relined with green leaves. It contained one egg nearly pure white, with one or two slight markings only; this I left, and returning three days later took a pair of eggs from the nest. The second egg was blotched and spotted all over."

Mr. G. A. Keartland, of Melbourne, Victoria, has sent me the following notes:—"During the wanderings of the Horn Scientific Expedition in Central Australia, a pair of Whistling Eagles (*Haliastur sphenurus*) were seen at almost every water hole passed. They seem to vie with the Crows in their onslaughts on dead carcasses, and only attack living prey when pressed by hunger. In North-western Australia I saw one attacking a flock of Rose-breasted Cockatoos, and if undisturbed would no doubt soon have killed one. Near Melton, Victoria, they are numerous in the rabbit infested country, and watch the trappers in order that they may feast on the entrails of the rabbits killed."

Dr. A. M. Morgan writes me as follows from Adelaide, South Australia:—"During a trip made from Port Augusta to Mount Gunson, in July and August, 1900, *Haliastur sphenurus* was a common bird, associating with *Milvus affinis* in seeking offal about slaughtering-places.

A nest was found on the 7th August, at Elizabeth Creek, not quite finished, and another at Port Augusta on the 15th August, in a dead Gum, containing newly hatched young. During a trip made to the Gawler Ranges in company with Dr. A. Chenery, in August, 1902, only one bird of this species was seen at Wartaka west.

"I have met with *Haliastur sphenurus* from Henley Beach, in the south, to the Elizabeth Creek in the north of South Australia. My first experience of it was about 1883, between Geelong and Queenscliff, where I took three eggs from a nest in a high Gum-tree about fifty feet from the ground, but I do not now remember the exact date. On the 18th August, 1890, I went a trip to Point Sturt, on Lake Alexandrina, and found five nests of this bird. The nests varied greatly in size, for though some of them were scarcely larger than an ordinary sized Magpie's nest, two of them were conspicuous objects at a distance of two miles. I think that when undisturbed the birds add to the nest each year, as the increase in size was vertical rather than horizontal. All these nests were in large *Casuarina* trees, and were built of dry sticks, some of them as much as a quarter of an inch in diameter, and were lined with green *Casuarina* leaves. The big ones were veritable charnel houses of rabbit bones, with here and there the backbone of a fish. I have never seen them fishing, but have often seen them hawking along the shores of the lake, so the fish were probably dead ones, which had been washed up on the shore, but they undoubtedly kill large numbers of rabbits, and never interfere with lambs, so should be cherished by the farmer. The earliest date of breeding in my experience was 7th August, 1900, and the latest 24th October 1898, when I took two fresh eggs from a nest at the Finnis River."

Mr. Tom Carter sends me the following notes from Broome Hill, South-western Australia:—
 "The Whistling Eagle (*Haliastur sphenurus*) was fairly common inland from Point Cloates, North-western Australia, and I have noticed them about the Swan River, in the south-west. They feed largely on wild ducks, but one picked up near Point Cloates contained several yellow land crabs in its crop. The nest is usually in the main fork of a large tree, and the eggs are laid about the middle of July. Two is the usual clutch, but three were once observed in a nest."

The nest is a large open structure, externally formed of thick sticks and twigs, and is lined inside with Eucalyptus leaves. It is generally placed on a horizontal, or in a thick upright fork of a tree, and often from eighty to one hundred and twenty feet or more from the ground. When unmolested, however, and the timber is small, it frequently builds low down, sometimes in the crown of a Pine-tree at an altitude of twelve to twenty feet. Finches and some of the smaller birds often construct their nests underneath those of the Whistling Eagle, and Mr. W. B. Barnard informs me that he has several times found the nests of *Pachycephala rufiventris* in that position.

The eggs are usually two, sometimes three in number for a sitting, ranging from rounded oval to oval in form, some specimens being somewhat pointed at the smaller end, the shell slightly coarse-grained and as a rule dull and lustreless. They are of a dull white, or faint bluish-white ground colour, which may be stained, mottled, spotted or boldly blotched with different shades of brown, reddish-brown or reddish-chestnut. Some have the markings very pale yellowish-brown intermingled with large underlying clouded patches of pale purplish-grey, while specimens may be found which are almost or entirely devoid of markings. There seems to be no limit to the character of their markings or the diversity of colour. While some are boldly blotched with reddish-brown, others appear as if they had been marked with the tip of the finger dipped with pale yellowish-brown paint. The eggs of the Whistling Eagle are almost as variable in colour and markings as some of the Tern's eggs, and two distinct types are sometimes found in the same nest. A set of two taken by the late Mr. K. H. Bennett, at Yandembah Station, Lachlan District, New South Wales, on the 24th September, 1889, measures:—Length (A) 2.32 × 1.7 inches; (B) 2.26 × 1.68 inches. A set of two taken by Mr. H. G. Barnard on the 27th March, 1892, at Coomooboolaroo, Duaringa, Queensland, measures:—Length (A) 2.05

× 1.75 inches; (B) 2.11 × 1.74 inches. A set of three taken by Mr. T. P. Austin at Colborrah Station, Cobbara, New South Wales, on the 14th September, 1908, measures:—Length (A) 2.2 × 1.69 inches; (B) 2.28 × 1.65 inches; (C) 2.25 × 1.72 inches. Among a fine series the extremes of variation are exhibited in measurement by two sets in Mr. Austin's collection. One taken by him on the 20th July, 1909, measures:—(A) 2.28 × 1.67 inches; (B) 2.22 × 1.7 inches. From the same nest a set of three Brown Hawk's eggs were taken on the 21st August, 1909, and another set of Whistling Eagle's on the 27th September following. A set of two of the latter species taken by Mr. Austin in the same locality on the 6th August, 1909, measure alike 1.96 × 1.58 inches. Three sets I saw him take on the 11th, 15th and 18th October, 1910, measure respectively:—Length 1. (A) 2.08 × 1.57 inches; (B) 2 × 1.53 inches. 2. (A) 2.2 × 1.75 inches; (B) 2.13 × 1.65 inches. 3. (A) 2.13 × 1.67 inches; (B) 2.17 × 1.7 inches.

Nestlings about a fortnight old are covered with short white down, that on the head being long and hair-like; bill and cere dark horn colour; legs and feet bluish-white; iris light reddish-brown. When nearly fledged they resemble the adults, but are dark brown on the head and hind-neck, each feather being mesially streaked with tawny fulvous, remainder of the feathers on the upper parts largely tipped with fulvous-white, and without the black shaft streaks; on the under parts the feathers are darker and conspicuously streaked with tawny-fulvous; wing 12 inches. Fully fledged birds have the streaks on the head and upper and under parts much narrower and lighter, as are also the tips of the upper wing-coverts and feathers of the back and rump. Wing of young female 14.2 inches.

In Northern New South Wales Mr. G. Savidge informs me that this species breeds at any time of the year. The usual breeding season in Central New South Wales begins in May, and continues until the end of December. In Southern New South Wales it is from August until the end of January, in both districts odd nests, however, may be found during the intervening months. In North-western Australia Mr. Tom Carter found most nests with eggs in July. In Queensland Mr. H. G. Barnard has found it breeding throughout the greater part of the year. The duration of the breeding season, however, depends much on whether the birds are molested or not. Mr. Barnard informs me that at Coomooloolaroo, Duaringa, Queensland, a pair of these birds have built in the same tree for some years, and it contains no less than five different nests; several times he has taken two sets of eggs in one season from this pair of birds, when they would lay a third and rear their young.

As will be seen by Mr. Thos. P. Austin's notes, during different seasons he has taken eggs in Central New South Wales in every month of the year.

Genus MILVUS, *Cuvier*.

Milvus affinis.

FORK-TAILED KITE.

Milvus affinis, Gould, Proc. Zool. Soc., 1837, p. 140; *id.*, Bds. Austr., fol. Vol. I., pl. 21 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 49 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 323 (1871); *id.*, Hand-l. Bds., Vol. I., p. 268 (1848).

ADULT MALE.—*General colour above brown, crown of the head, nape, hind-neck, lesser and median upper wing coverts pale rufous-brown with blackish shaft streaks; primary coverts and most of the quills blackish-brown, the inner primaries and scapulars brown with narrow whitish-brown margins at the tips and blackish shafts; tail-feathers ashy-brown slightly washed with rufous, and having brownish-white tips, smaller on the outermost feather on either side, which is darker on the outer web, and all having the remains of darker brown cross-bars; lores, chin and small feathers below the eye dingy-*

white, these parts being covered with fine black hairs; ear-coverts dark brown, narrowly streaked with black, their bases whitish; throat dull white with narrow blackish shaft streaks, the apical portion of some of the feathers on the sides slightly washed with rufous; remainder of the under surface rufous-brown, with distinct blackish shaft streaks, broader on the upper breast, narrower on the abdomen; thighs and under tail-coverts rufous-brown, with narrow blackish shafts; bill black, dark slate colour at the base; cere yellowish; legs and feet yellowish; iris dark brown. Total length in the flesh 20·5 inches, wing 16, outer tail-feathers 10·5, central tail-feathers 8·25, bill 1·3, tarsus 2·1.

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

THE Fork-tailed or Allied Kite is generally distributed, in favourable situations, over the greater part of the Australian Continent. While resident throughout the year, and breeding in some districts, it is entirely irregular and nomadic in habits in other parts of the country, appearing in vast flocks one season, and then absent perhaps for many years. It occurs principally in the inland portions of the States, and in New South Wales seldom appears in the coastal districts, except during one of the above referred to irregular visits. There are specimens in the Australian Museum Collection obtained by the late Mr. Alexander Morton, at Port Essington, in the Northern Territory of South Australia; by Mr. George Masters at Eastern Creek, twenty-five miles west of Sydney, and by the late Mr. K. H. Bennett at Yandembah Station, in the Lachlan District, New South Wales. On the opposite side of the continent the late Mr. T. H. Bowyer-Bower obtained specimens near Derby, North-western Australia in 1886, and ten years later Mr. G. A. Keartland noted it in the same locality, while a member of the Calvert Exploring Expedition, and Mr. Tom Carter observed it inland while resident at Point Cloates, where he found it breeding.

Its food consists of small mammals and reptiles and largely of insects; also offal obtained at slaughtering places in country districts. It is the reverse of shy, and ventures where very few other species will to satisfy its hunger. In the "Proceedings of the Linnean Society of New South Wales"* Messrs. J. D. Cox and A. G. Hamilton referring to this species remark:—"We have known this bird to swoop down and carry away the meat off a dish, as it was being taken from the kitchen to the house."

There is but little variation in a number of specimens examined from different parts of Australia, the preceding description being taken from an adult male shot near the nest by the late Mr. K. H. Bennett.

While resident at Ripple Creek, Herbert River, North-eastern Queensland, Mr. J. A. Boyd wrote me as follows under date 11th May, 1894:—"It is strange how late *Milvus affinis* are breeding. A pair of Kites are busy building a new nest; one bird brings sticks, and the other stops inside and fixes them; unfortunately this year they have chosen a somewhat slender limb, which I fear will not bear the weight of a blackfellow." Writing later on the 8th August, 1894, he remarks:—"Two nests of *Milvus affinis* climbed to to-day by an Aboriginal; both had young."

Captain Sturt remarked:†—"The Allied Kite (*Milvus affinis*) is common over the whole continent of Australia. They are sure to be in numbers at the camps of the natives, which they frequent to pick up what may be left when they go away. They are sure also to follow any party in the bush for the same purpose. About fifty of these birds remained at the Dépôt [North-western New South Wales], with about as many Crows, when all the other birds had deserted us; and afforded great amusement to the men, who used to throw up pieces of meat for them to catch in falling. But although so tame that they would come round the tents on hearing

* Proc. Linn. Soc. N.S. Wales, Vol. IV., 2nd Ser., p. 398 (1889).

† Exped. Centr. Austr., Vol. II., App., p. 15 (1849).

a whistle, they would not eat anything in captivity, and would have died if they had not been set at liberty again. It was this bird which descended upon Mr. Browne and myself in such numbers from the upper regions of the air, as we were riding on some extensive plains near the Depôt in the heat of summer. There can be no doubt but that in the most elevated positions, where they are far out of the range of human sight, they mark what is passing in the plains below them."

While resident in 1886 at Mossgiel, New South Wales, the late Mr. K. H. Bennett wrote as follows:—" *Milvus affinis* is only an occasional visitant to this district, appearing here at uncertain intervals in incredible numbers, and remaining for more or less lengthened periods, sometimes over twelve months. I first saw them in 1856, when they came in thousands. On four or five occasions they have since appeared in equally large numbers, but always with an interval between each visitation, but for the last eight years only an occasional straggler has appeared. I found two of their nests, but I am of opinion that they rarely breed here. They were open structures, and somewhat deeper than those made as a rule by the Accipitres, and compactly built of small sticks, lined with decayed bark fibre, and in each instance contained three eggs: the nests were built rather high up in Eucalypts. The food of this bird consists chiefly of offal and garbage of all kinds, and the only prey I have seen it attempt to capture are grasshoppers, of which they destroy great numbers, flocks of Kites following the flying cloud of insects, darting in among them and clutching one or more in each claw, devouring them whilst on the wing. At certain times the grasshoppers deposit their eggs just beneath the surface of the ground, on bare patches on the plains, and this is another harvest for the Kites, who assemble in large numbers, scratch up and devour the eggs. I have frequently seen several of these birds hovering over the fowl yard when the fowls were being fed, and darting down snatch a bit of bread or meat from an unwary hen, but never attempting to capture the smallest chicken."

Mr. Bennett also, while resident at Yandambah Station, in the Lachlan District, South-western New South Wales, made the following notes:—" On the 24th September, 1889, I observed a pair of *Milvus affinis* building in the top of a Pine-tree, from which I took two eggs on the 8th October. I took another set of two on the 28th November, from a disused nest of *Hieracidea orientalis*; and on the 20th December found a nest containing two eggs just upon the point of hatching. The nest is a rough structure, very similar to that of *Circus assimilis*, Jard. and Selby, composed outwardly of sticks, and in four nests I have examined lined with small pieces of sheep skin with the wool on, picked up from carcasses of dead sheep scattered over the plains. The nests are placed as a rule in the tops of Pine-trees (*Callitris*, sp.), where the topmost branches divide, forming a three or more pronged fork, which securely holds the structure in position. As a rule the prey of this bird consists of insects, small reptiles, etc., to which offal is added whenever obtainable, but this year the prey, judging from the quantity of remains in the nests, as well as on the ground beneath, consists chiefly of rabbits of all sizes, which, considering the comparative weakness of this bird's talons, is somewhat singular. On the 5th January, 1890, I took a young *Milvus affinis*, lately hatched, from a nest containing two. On my way home I visited another nest of the same species in which, on the 20th December, I found the eggs on the point of hatching, but on reaching the spot found there was only one young one, the chick in the remaining egg being dead. As the young one in this nest was older, I took it and placed the younger one from the 5th January nest in its place. On the 25th January I took the young *Milvus affinis*, now nearly able to fly, from the nest which I obtained the companion bird from on the 5th instant. On my way home on this latter occasion, I again visited the 20th December nest, and finding the substituted bird was in better plumage than the one I had, again 'rung changes,' and taking it have skinned it. On the 4th February I visited the latter nest (20th December) intending to take the young bird, but just as I reached the structure it flew off. Visiting this nest again on the 9th August, which the old birds have frequented ever since, I found that it

was used as a feeding place and repository for prey, it being entirely filled with the remains of rabbits in a more or less fresh state. On my way home on the 16th September, I found two nests of *Milvus affinis*, each containing three eggs. One of these nests was the one from which the young flew I attempted to capture on the 4th February last. The nests were in adjacent trees, and not more than twenty yards apart, and in this small clump of not more than a dozen Pine trees were the nests of five species of Accipitres all occupied at the same time. A week later I took another set of two eggs. The three pairs of *Milvus affinis*, from the nests of which I recently took the eggs, still continued to keep about the trees containing their nests, and on examining one I found that a Kestrel (*Tinnunculus cenchroides*) had taken possession, in which it had deposited two eggs. The pair of Kites from the nest of which I took two eggs on the 23rd September, rebuilt in an adjoining tree, and on the 14th October I obtained two eggs from it. These birds were apparently of a literary turn of mind, as the lining of the nest was constructed of large pieces of newspaper in addition to the usual pieces of sheep skin with wool on."

Dr. W. Macgillivray sends me the following notes from Broken Hill, in South-western New South Wales:—"The dark form of *Milvus affinis* may often be observed circling round nearly every homestead and camp throughout the district, always on the look out for stray scraps of meat, and not despising a chicken or young bird. To see them flying around overhead or flapping lazily along over the creek timber, one is apt to imagine the Kite a slow bird, but to see the same bird swoop for a piece of meat or other object on the ground, the illusion is dispelled, the swoop being lightning-like in rapidity and accuracy. They are never seen in such numbers here as in the Gulf District in Queensland. Their chief food here is the eternal rabbit, mostly young ones, and also smaller mammals and reptiles. Nesting commences late in August or early in September, and continues till the end of October, usually in the Gums which line the creeks of the open. The nests are small, compact, stick-built structures, somewhat flat, placed usually low down, from ten to thirty feet from the ground in a main fork of a tree, lined with wool and rabbit fur, and are often relined year after year. Eggs are two or three in number, and take about three weeks to hatch; the young when hatched are covered with fawn-coloured down, with lighter space round the eyes, irides brown, legs and bill greenish in colour. The young in the same nest are often of varying size."

From Melbourne Mr. G. A. Kearthland writes me as follows:—"During the journey of the Horn Scientific Expedition in Central Australia, in 1894, *Milvus affinis* was noted at every slaughter yard of stations passed, where they were seldom interfered with, as they only picked up the scraps of meat, and never interfered with the domestic poultry. One female at Henbury would come right into the camp and pick up the bodies of the birds thrown to it, which I had skinned. Again, while a member of the Calvert Exploring Expedition, I met with this species in large numbers while in camp at the junction of the Fitzroy and Margaret Rivers, in 1897. During the heat of the day they seek shelter from the sun amongst the branches of the various trees, but both during the morning and the evening they are either on the wing or seeking food on the ground, grasshoppers forming the chief part of it. As in Central Australia, they were more numerous about killing yards, and are useful in clearing away offal. They were building in the Baobab-trees during March and April. As they are harmless and well known to me, I did not trouble to procure a specimen."

From Broome Hill, South-western Australia, Mr. Tom Carter writes:—" *Milvus affinis* occurred commonly in the north-west in good seasons, and was more numerous inland from Point Cloates than on the coast. In 1900 they were in great numbers, and while driving along inland in my buggy, several would accompany it all day in order to catch and feed on the numerous grasshoppers, etc., disturbed out of the grass. At times they flitted so close to the horses' heads as to make them frightened and nervous. The grasshoppers appeared to be caught

in the Kites' feet, from which they were eaten as the birds continued their flight. Their nests are usually built on horizontal boughs. The clutch of eggs is generally two, occasionally three, and laid in July. Several nests containing eggs were found between the 19th and 22nd July, 1900. One or two of these birds have been noticed at Broome Hill."

The eggs are two or three in number for a sitting, more frequently the former, varying from oval to rounded oval, and almost globular in form, the shell being comparatively close-grained, and although occasionally having a few limy excrescences, dull and lustreless. They vary considerably in size, shape, and disposition of their markings, even in the same set. Typically they are of a dull white ground colour, which is more or less marked with spots, blotches, short wavy streaks, or hair lines of umber or reddish-brown scattered over the shell, often at one end only; on some the markings are small, dark and very distinct; on others they are pale, large and have a blurred look, forming in places clouded patches, and resembling very much the markings seen on some varieties of eggs of the Sooty Tern (*Sterna fuliginosa*). Others are thickly covered with indistinct fleecy markings of pale reddish-brown, being larger on the thicker end, where are intermingled small clouded underlying patches of pale purplish-grey. Three sets taken by the late Mr. K. H. Bennet at Yandebah Station, New South Wales, measure as follows:—A set of two, varying much in size, shape and markings taken on the 28th November, 1889, are:—Length (A) 1·83 × 1·56 inches; (B) 2·03 × 1·53 inches. A set of two taken on the 23rd September, 1890, measures:—Length (A) 2·18 × 1·58 inches; (B) 2·21 × 1·63 inches. A set of three taken on the 18th October, 1890, measure:—Length (A) 2·18 × 1·73 inches; (B) 2·15 × 1·7 inches; (C) 2·12 × 1·7 inches.

Young birds shortly before they leave the nest are brown above, with pale rufous-brown tips to the feathers and blackish shaft streaks, those on the head and hind-neck having their centres pale brown, and the shaft streaks less distinct; quills blackish with small rufous-brown tips; tail feathers dark greyish-brown indistinctly crossed with dull brownish-black bars, and largely tipped with pale rufous; chin and throat covered with short dull white down, with which are sparingly intermingled some narrow rufous feathers; remainder of foreneck and breast brown, slightly darker than the upper parts, each feather centred with rufous and having a blackish shaft streak; abdomen and under tail-coverts rufous-brown, the thighs slightly darker, all the feathers having brownish-black shafts. Wing 10·5 inches.

In North-western Australia Mr. G. A. Keartland noted this species building on the Margaret River, in March and April, and inland at Point Cloates Mr. Tom Carter took several sets of eggs in July. In New South Wales the late Mr. K. H. Bennett obtained eggs from the 23rd September to the 20th December, and young as late as the 25th January.

Genus LOPHOICTINIA, *Kaup.*

Lophoictinia isura.

SQUARE-TAILED KITE.

Milvus isurus, Gould, Proc. Zool. Soc., 1837, p. 140; *id.*, Bds. Austr., fol. Vol. I., pl. 22 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 51 (1865).

Lophoictinia isura, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 326 (1874); *id.*, Hand-l Bds., Vol. I., p. 269 (1899).

ADULT MALE.—*General colour above blackish-brown, with narrow pale brown edges around the tips of most of the feathers, the scapulars similar, but having the concealed portion of the feathers brownish-grey; apical portion of the primaries dark brown, washed with grey, their inner webs barred with blackish-brown, their basal half brown on the outer web, greyish near the shaft on the*

inner web, which is broadly margined with white as far as the notch, and having the remains of a few brown cross-bars, the secondaries and greater upper wing-coverts brown with darker brown cross-bars; the lesser and median upper wing-coverts pale brown margined with whitish brown, more largely on their inner webs, which are washed or mottled in parts with rufous, the apical portion of some of the median coverts having narrow blackish-brown shaft streaks; tail feathers brown above, washed with ashy, more distinctly on their outer webs, and having the remains of brown cross-bars, and a well defined dark brown terminal band, all the feathers narrowly edged with white around their tips; head and hind neck rufous, broadly streaked with black, and having whitish bases to the feathers, the rufous colour decreasing on the crown of the head, and being entirely lost on the forehead, which is white with narrow black shaft lines; lores almost bare, and sparsely covered with fine black hairs; chin and cheeks greyish-white, with narrow black shaft lines; ear-coverts grey, with broader black shaft streaks; the entire under surface of the body rufous, the sides of the neck washed with grey, the feathers on the latter, the foreneck and breast broadly streaked down the centre with blackish-brown, and passing into narrow black shaft stripes on the abdomen and flanks; under tail-coverts fulvous, washed with rufous, their shafts slightly darker; under surface of tail feathers light ash-colour, with a pale brown terminal band; bill bluish at the base, black at the tip; cere fleshy-white; legs and feet fleshy-white; iris yellow. Total length in the flesh 20 inches, wing 18, tail 10, bill 1.2, tarsus 2.

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—(Queensland, New South Wales, Victoria, South Australia, Western Australia.

IN addition to the square form of the expanded tail feathers of the present species, it may also when perched easily be distinguished from the Fork-tailed Kite by its abnormally long wings, which extend beyond the tips of the tail feathers, and moreover by the feathers of the head forming a well-defined occipital crest. Its range, too, is more circumscribed, not being found in the extreme northern and north-western portions of the continent, and it is far less abundantly distributed everywhere. Gould found this species breeding at Scone, on the River Hunter, New South Wales, in November, and Gilbert found a nest with young in the same month in Western Australia. In Queensland Mr. E. A. C. Olive obtained an adult female at Cooktown on the 1st November, 1902, Mr. H. G. Barnard has taken many sets of eggs at Coomoooolatoo and Bimbi, Duaringa, and Mr. George Masters procured an adult female at Gayndah, Burnett River. In the Central District of New South Wales, Mr. E. H. Lane found it breeding on several occasions on Wambangalang Station, about nineteen miles from Dubbo, and while with the Calvert Exploring Expedition in July, 1896, Mr. G. A. Keartland found a nest containing a nearly fledged young bird in a Cork-bark tree, in the vicinity of Lake Augusta, Western Australia. I have known the Square-tailed Kite to be obtained in the neighbourhood of Sydney on two occasions only, and in both instances the birds were driven to the coast during periods of excessive drought inland. The bird on the former occasion was procured at Ashfield, and the latter, presented to the Trustees of the Australian Museum, at Carlingford, by Mr. F. Kingcott, on the 9th September, 1895, and which is now mounted in the national collection. In the crop of this specimen were found seven callow young birds.

There is not a great deal of variation in a number of specimens examined, the wing-measurements of adults varying from 18 to 19.5 inches. An adult male that lived for some time in the Botanic Gardens, Sydney, and was subsequently presented to the Trustees has, however, the feathers on the forehead grey instead of white, the ear-coverts are grey with small dark brown tips, and the inner lesser and median upper wing-coverts are broadly margined with rufous.

Mr. H. G. Barnard, of Bimbi, Duaringa, Queensland, writes me:—"I found three nests of *Lophoictinia isura* in 1907, the first on the 28th September contained one young bird just hatched and two eggs, from which the beaks of the young birds were protruding. The second nest was found on the 3rd October, and contained two young and an egg that was chipping; the third

nest was found a few days later, and contained three young birds; the nests were all built in narrow-leaved Ironbark (*Eucalyptus*), and were about fifty feet from the ground. These Kites are one of the least shy of the Accipitres, often remaining on the nest till the climber is almost within reach of the nest. The nests are outwardly constructed of sticks and lined with Eucalyptus leaves. One nest built in a Eucalyptus, fifty-six feet from the ground, measured externally two feet ten inches in diameter by one foot in depth, and the egg cavity fourteen inches in diameter by three inches in depth. Another deep nest built sixty feet from the ground measured externally two feet eight inches in diameter by two feet in depth, the egg cavity measuring ten inches in diameter by three inches in depth. I went to a good deal of trouble in measuring these nests, which in some cases is a very awkward proceeding when perched on a high bough with note-book and measure. By the egg cavity is meant the part of the nest lined with leaves (these leaves are picked off separately, and not attached to twigs); in the case of the Square-tailed Kite and Little Eagle the lining is from two to three inches thick, making a soft bed for the eggs and young. As shewing the partiality of the Accipitres for old nests, one in which three young Square-tailed Kites were reared last year is this year occupied by a Little Eagle, and a nest occupied last year by a Brown Hawk is now occupied by a Square-tailed Kite. Again in June 1907 a pair of Wedge-tailed Eagles rebuilt an old nest, and when ready for the eggs for some reason deserted it: the nest is now occupied by a pair of Brown Hawks.

“Birds of prey are very fond of company, as the following will illustrate. Where the first nest of *Lophoictinia isura* was found there were nests also of *Hieracidea orientalis* with three young, *Nisæetus morphnoides* with one young, *Astur approximans* building, from which I afterwards took a set of four eggs, *Accipiter cirrhocephalus* building on same date as I took set of *Astur approximans* eggs; I took a set of four from this nest. At the second nesting site of *Lophoictinia isura* were nests of *Hieracidea orientalis* with young, and nests of *Astur approximans* building and *Accipiter cirrhocephalus* with three eggs. The third colony contained the same species. Only one pair of each species was in each colony. An Ironbark (*Eucalyptus*) ridge seemed the favourite locality. The birds resort to the same place year after year to breed if not disturbed.

“The food of the Square-tailed Kite consists of young birds, which are evidently in many instances taken from the nest, as a nest of *Ptilotis fusca* with a dead fledgling clinging to it was found in one of their nests. They also eat insects, as a large Mantis was dead in one nest, and was evidently left there for the female.”

Mr. E. H. Lane, of Orange, sends me the following notes:—“In the early eighties I took several clutches of Square-tailed Kite eggs on Wambangalang Station, New South Wales, three always being the number. The only set I have left was taken in October, 1883, and when I climbed to this nest there were but two eggs in it, which I took, as the tree was a very difficult one to surmount. The following day the Kite was again sitting, so expecting to get another egg I managed with the aid of some of my shearers to get a rope over the horizontal limb, on which the nest was, and we hauled up my eldest son, then thirteen years old, and I was rewarded by the addition of another most beautiful egg. In another instance, after robbing three eggs from a nest, the Kite was on the nest the following day, but upon again climbing to it there was no egg. I mention this to shew that this bird does not easily desert its nest. Every nest that I ever found of the Square-tailed Kite was within from two yards to one hundred yards of a creek or water course. I have not taken any eggs for twenty odd years past, what nests I have seen being ungetatable without proper appliances.”

The eggs, which are remarkably handsome and boldly marked, are usually three, sometimes only two in number for a sitting, varying from rounded oval to oval in form, some specimens being rather pointed at the smaller end; they are coarse-grained, and the shell generally dull and lustreless. In six sets now before me only one set is slightly glossy. They vary in ground colour from pure white to a warm buffy-white, and which is usually spotted and boldly blotched

with rich reddish-brown, purplish-red, or pale purplish-grey, the latter more frequently consisting of underlying markings. In some they are entirely rich reddish-brown, in others there is a blending of the different shades of red and purple, while one unusually marked specimen has a cap of clouded purplish-red and purplish-grey on one end, and a similar cap of rich-reddish brown markings on the other. The markings frequently consist of a cap or zone, and often at the smaller end; others are sparingly spotted over the remainder of the shell, while occasionally they may be heavily blotched, or have large coalesced patches of different shades of red and purple almost entirely obscuring the surface of the shell.

A set of three received in 1883 from the late Mr. George Barnard, of Coomooboolaroo, Duaringa, Queensland, measures:—Length (A) 2.06 × 1.67 inches; (B) 2.05 × 1.67 inches; (C) 2.03 × 1.57 inches. A set of three taken on the 31st August, 1908, by Mr. H. G. Barnard, at Bimbi, Duaringa, Queensland, measures:—Length (A) 2.05 × 1.58 inches; (B) 2.11 × 1.58 inches; (C) 2.07 × 1.57 inches. Another set of three taken by Mr. Barnard on the 7th September, 1908, measure:—Length (A) 2.08 × 1.62 inches; (B) 2.22 × 1.58 inches; (C) 2.22 × 1.63 inches. A set of two taken on the 9th October following, measure:—Length (A) 2.22 × 1.54 inches; (B) 2.17 × 1.51 inches.

In Eastern Australia August until the end of December constitutes the usual breeding season. In Western Australia Gilbert found a nest with young in November, and Mr. G. A. Keartland a nest containing a young one in July.

Genus GYPOICTINIA, *Kaup.*

Gypoictinia melanosternum.

BLACK-BREASTED KITE.

Buteo melanosternum, Gould, Proc. Zool. Soc., 1840, p. 162; *id.*, Bds. Austr., fol. Vol. I., pl. 20 (1848).

Gypoictinia melanosternon, Gould, Handbk. Bds. Austr., Vol. I., p. 47 (1865).

Gypoictinia melanosterna, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 335 (1874).

Gypoictinia melanosternum, Sharpe, Hand-l. Bds., Vol. I., p. 269 (1899).

ADULT MALE.—*General colour above blackish-brown, darker on the upper back, the scapulars and feathers on the lower portion of the back washed or margined with rufous; the smaller upper tail-coverts brown washed with rufous, some of the feathers entirely rufous, the longer ones brown with a blackish wash on their apical portion; upper wing-coverts black, the central series having their inner webs broadly margined with rufous; the inner series greyish-white, centred with brown, some of them mottled with rufous near their tips; the outer series of lesser wing-coverts ash-grey with blackish-brown centres; apical portion of the primaries blackish-brown, their basal half white, the outer webs of the four outer ones grey; tail brownish-grey, the basal portion of the inner webs of the lateral feathers white freckled or mottled with brown; crown and sides of the head black; the nape tawny-rufous with blackish shaft streaks, or stripes, and passing into rufous on each side of the neck; all the under surface blackish-brown, with indistinct black margins to the feathers on the foreneck and upper breast; the lower breast washed with rufous, more distinctly on the sides; thighs rufous, some of the feathers with whitish margins and blackish shaft lines; "bill light horn colour, darker at the tip; cere pinkish-white; tarsus and feet pinkish-white; iris rich hazel."* (Bennett). Total length in the flesh 22 inches, wing 18.5, tail 8.75, bill 2, tarsus 2.7.

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

THE Black-breasted Kite is chiefly an inhabitant of the inland portion of the Australian States, although it was found by the late Mr. T. H. Bowyer-Bower, near Derby, in North-western Australia, and there is a specimen in the Australian Museum Collection obtained at Cooktown by Mr. E. A. Olive on the 17th August, 1892; there is also another specimen from one of the coastal districts in South-western Australia. Gould described this species in the "Proceedings of the Zoological Society," of London, in 1840, from a specimen obtained in the interior of New South Wales, and refers to its Emu-egg breaking proclivities in Western Australia, as told him by his assistant John Gilbert, upon the authority of the Messrs. Drummond, who derived their information from the Aborigines, Gould concluding his remarks:—"Specimens of this bird are much required by the museums of Europe; it is to be wished also that persons favourably situated would ascertain if the story of the birds breaking the eggs of the Emu are correct, or if it be one of the numerous myths of the Aborigines." Many years after the late Mr. K. H. Bennett confirmed the accuracy of this information, as well as supplying several persons in the United Kingdom with skins and eggs of this species, including the late Mr. J. H. Gurney of the Norwich Museum, the then supreme authority on the diurnal and nocturnal birds of prey. It is also due to the exertions of Mr. K. H. Bennett that so fine a series of these birds and eggs are included in the collection of the Australian Museum, the former consisting of nestlings a few days old, young birds nearly fledged, and adults shot at the nest.

Gould first, and subsequently other writers, have referred to the white patch at the base of the primaries, so conspicuous during flight, when seen from beneath, but no one so far as I have observed has made any reference to the wide variation in colour of the adults of this species. Some specimens obtained in the same district are as different in colour as the light and dark varieties of the Wedge-tailed Eagle (*Uroætus undax*), only in this instance age has apparently nothing to do with this distinction. Of two adult females now before me, both shot at the nest by the late Mr. K. H. Bennett, respectively in October and November, in the Central District of New South Wales, the former agrees very well with the above description, but the latter varies in the following respects. All the feathers on the upper parts are margined with rufous, the inner series of the upper wing-coverts are pale tawny-fulvous, as are also the feathers on the head and nape, their bases whitish, those on the forehead and hind neck only having blackish central streaks; all the under surface creamy-fulvous washed with rufous, except on the flanks and thighs, most of the feathers on the fore-neck and upper breast having blackish-brown central streaks, and several of those on the middle of the lower breast broadly centred with brown near the shaft of the inner web only. The abraded quills and tail-feathers, and being shot while nesting, conclusively prove that this difference in colour is not the result of immaturity. Wing 18.2 inches. An adult male procured in Western Australia is just the reverse, being blackish above and below, with scarcely a trace of rufous on the feathers of the upper parts, the upper wing-coverts and the nape and hind-neck being brown, some of the feathers having darker centres and whitish edges. Wing 18 inches.

The following information relative to the habits and nidification has been extracted from notes of the late Mr. K. H. Bennett, made at Mossgiel, South-western New South Wales:—"Gypoictinia melanosternon preys to a great extent on various reptiles, such as snakes, frill-necked and sleepy lizards; it has also the singular habit of robbing the nests of Emus and Bustards of their eggs. The manner in which they effect the abstraction of the Emu eggs—as told me by the blacks—shows an amount of cunning and sagacity that one would scarcely give the bird credit for, and is as follows:—On discovering a nest the Buzzard searches about for a stone, or what is much more frequently found here a hard lump of calcined earth. Armed with this the

Buzzard returns, and should the Emu be on the nest, alights on the ground some distance off, and approaches with outstretched flapping wings, and the Emu hastily abandons the nest and runs away. The Buzzard then takes quiet possession, and with the stone breaks a hole in the side of each egg, into which it inserts its claw and carries them off at leisure. I subsequently found portions of Emu egg shells in the nest of one of these Buzzards, and in a nest to which I recently ascended, which contained two young ones, I found amongst the remains of various reptiles the shells of a couple of Bustard's eggs.

"This bird constructs a large nest of coarse sticks, a slight depression in the centre being lined with Eucalyptus leaves. It is placed at a more or less greater distance from the ground, according to the height of the timber in the locality. As a rule it lays but two eggs, and although during the last seventeen years I have taken over a score of nests in the neighbourhood of Mossgiel, only once have I found a nest with three eggs. It usually lays about the middle of August, and the young birds leave the nest about the beginning of December. I have never known the Buzzard to touch carrion, or feed upon anything it did not capture, and except at the nest I have never seen them perch on a tree, but have often observed them alight on the ground. Since the invasion of rabbits I have noticed that it is one of the greatest enemies of the rodent. In a nest in which there was a young one, I counted amongst the remains of various other animals the skulls of twenty-one rabbits, and in another nest examined, from which a young one flew off as I ascended the tree, I found a perfect hecatomb of animal remains, those of rabbits predominating. On passing this nest a few days afterwards I noticed there were two young ones in it. The young of this species, when soon after emerging from the shell, are clothed with pure white silky down, with the exception of a crescent-shaped mark beneath the eyes, which is black. The down resembles that on the young of *Nisctus morphnoides*, and similar to that bird is longer on the head than elsewhere."

Writing from Yandembah Station, in the Lachlan District, New South Wales, Mr. Bennett remarked:—"On the 20th March, 1890, I observed a pair of *Gypsoictinia melanosternon* feeding upon a rabbit, which they had apparently just killed. On the 11th September, 1890, I came across an Emu's nest containing some eggs, or rather egg shells, the whole having been broken into on their sides and the contents devoured. The stone with which the eggs were broken was in the nest among the egg shells. The Buzzard must have carried this stone a long distance, as such a thing could not be found anywhere in the vicinity."

The late Mr. K. H. Bennett, while resident at Yandembah Station, writing in 1891 of the disappearance of certain species of birds in the Lower Lachlan District, remarked:—"That fine Raptorial bird, *Gypsoictinia melanosternon*, is now becoming rare in this district, where previously it was immensely abundant. In former years examples could be seen on any day, and the nests were to be frequently found. Now months may elapse without a solitary individual being seen; while for a radius of fifty miles I do not know of an occupied nest. I am of opinion their decrease is due to increase of population in this part of the country, not that the birds have been destroyed, for they are exceedingly shy and wary, and most difficult to shoot, but being so shy they evidently retreat from the presence of man; another cause is the rapid demolition of timber consequent upon increased population. Timber never was plentiful here, being chiefly in the shape of small clumps of a few acres in extent, dotted in long and irregular intervals (often miles between) over the plains. These clumps were the places in which their nests were constructed, and as a rule not more than two or three of the trees in any of the clumps were suitable for the construction of these huge nests, the generality of the trees being too small and the branches too weak to sustain the weight. As a natural consequence the larger trees were the first to fall before the selector's axe, as affording the largest quantity of timber or firewood, and the birds had, therefore, another reason for betaking themselves to more secluded

* Rec. Aust. Mus., Vol. I., p. 109 (1891).

localities. The favourite resort of this species is undoubtedly open country, such as before-mentioned, for some fifty or sixty miles to the northward heavily timbered country commences, extending for over one hundred miles, with thousands of trees suitable for the construction of their nests, yet it is only a passing straggler that is ever seen there, and I have never known or heard of an instance of their breeding in that locality."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray, writes:—" *Gypoictinia melanosternon* is a rare bird here. During nearly nine years residence, and a good deal of wandering through the scrubs and along the creeks of the district, I have only come across two pairs of these birds, and until 1909 had found only one nesting place. My notes must necessarily deal mostly with one pair of birds. In 1907 Mr. McLennan and I, with some others, on our return journey from Langawirra, camped on Yalcowinna Creek, about thirty-five miles from Broken Hill. Early next morning, 9th September, we proceeded to investigate the nesting along the creek; cutting off a large bend to leave a portion near the camp, we struck the creek where a Cockatoo (*Cacatua sanguinea*) flying from a hole forty feet up in a tall Gum attracted our attention to a large nest in the same tree, on which a bird was seen to be sitting. It was a very windy morning, and the bird sat very closely; sticks and stones were thrown up, but she did not move until a shot was fired in the air from the specimen gun, when a magnificent female of the Black-breasted Buzzard left the nest, but kept soaring round and round at a respectful distance. Seen from below she was a splendid bird, both from her proportions and colouring, her black breast and ruddy under surface, and the dark primaries contrasting with the conspicuous white band across their bases, easily distinguish her from all other birds of prey. The male, who soon joined her, is only about half her size, and not nearly so conspicuously marked; he has none of her rich colouring, no black breast, and pinions not so dark, his breast seen through the glasses being fawn coloured. When soaring, which they both do, like the Wedge-tailed Eagle, with the carpal joint fully extended and primaries all spread out and separate, the male appears in colouring like a brightly marked Little Eagle. The difference in size between male and female is, however, more marked even than in the Goshawks. When soaring round watching the climbers at work, the female kept uttering a series of short sharp cries in quick succession, much resembling the alarm note of the Wedge-tailed Eagle. The nest was at a height of about seventy feet, placed in the fork of a rather thin horizontal limb. Seen from below it presented a loosely built and flat appearance. Sticks half to one inch in diameter were used in its construction; it was two feet by three feet across, with an egg cavity nine inches in diameter, lined with green Gum leaves. The nest contained two fresh eggs. On the ground under the nest were the remains of rabbits. The Blood-stained Cockatoo's nest in the same tree contained three eggs.

"On the 9th September, 1908, we again visited this tree on our way out to Langawirra, and found the birds had constructed a new nest in the same position, the remains of the old one being on the ground below. The nest was very like the one of the previous season, so flat that the leaves of the lining showed through below. It also contained a pair of fresh eggs more marked than those of 1907. The Cockatoo's nest in the tree contained one egg. The birds were about the nest when we were returning, three weeks later, and I have no doubt but that they reared a brood on each occasion.

"On the 11th September, 1909, we paid our third annual visit to this nest; it was built again in the same situation, but contained only one egg of about a week's incubation. This egg was dumpier in shape, and the blotching very much darker than on those of the two previous years, and also we all remarked that the female seemed to be a different bird, not nearly so fine a one. Probably the old female had fallen a victim to poison, and the male had sought out another mate.

"On the 6th October, 1909, when working up Sleepswell Creek, about fifty miles from Broken Hill, Mr. McLennan and I came across a female Buzzard, a rather ragged looking bird,

and a little further along the creek found her nest, a large stick-made flat nest, newly lined with Gum leaves, placed as the other was in the fork of a horizontal limb, but only at a height of twenty feet from the ground. There were no eggs. Mr. McLennan visited this nest a fortnight later, and found it deserted. He also visited the nest on Yalcowinna Creek, and found one egg in it very like the one taken in September.

"On visiting our old tree on Yalcowinna Creek, in September, 1911, where we had found this species nesting for three successive years, we found it deserted by the birds, although there was evidence in the shape of an old nest in a new situation that they had utilised the tree last year. I flushed a bird, however, from the Sleepswell Creek nest, which we found in 1909; this year it contained two fine eggs, which were on the point of hatching, one being chipped. This nest is quite low down in an old Creek Gum, and just below the nest was a hollow occupied by five almost fully fledged Barnard Parrakeets."

From Orange, New South Wales, Mr. E. H. Lane writes me as follows:—"I have never had the pleasure of robbing a Black-breasted Buzzard's nest, but send you reliable notes from my friend, Mr. H. S. Burcher, who has had many years experience in the Mossgiel District. I got the first set of Buzzard's eggs from Mr. Burcher in 1899, the handsomest and largest specimens I have ever seen, and taken on the 24th September. Mr. Burcher being in South Africa in 1900, I arranged with a person on the station to collect for me, and during that year he took a set of two eggs on the 16th September, and another set of two eggs on the 14th October. Unfortunately this man left the station before the nesting season, and as my friend did not go to the district again until 1905, I lost the previous four years' harvest. Mr. Burcher found another nest that year, which he robbed of two eggs on the 22nd September, and on the 26th October, 1905, he took two more from the same nest. He finally left the Mossgiel District in 1906, and I have failed to get any more of these eggs since."

Through Mr. E. H. Lane I have also been favoured by the following notes from Mr. H. S. Burcher:—"On Conoble Station, forty miles north-east from Mossgiel, New South Wales, I took two eggs of the Black-breasted Buzzard on the 23rd August, 1897, and another egg from the same nest about the 20th September. In 1898 I took an egg on the 24th September, and heard in November from a friend on an adjoining station that a nest of this species contained two young ones. In 1895 Mr. Lindsay Cameron took two eggs from the same nest as I did, and one egg from it in 1896, and heard from Mr. Whitty, the manager of an adjoining station, that the Black-breasted Buzzards had young ones in the same nest for the previous five or six years. When this species is breeding it is very slow in taking fright from any one approaching near the nest, but once it is hunted off it flies right away, and does not return for some time. They keep about the nesting place for some two months or more, and reline the nest with gum leaves about a month before laying. I have seen these birds eating Emu eggs after breaking them; on one occasion a large piece of bone was in the nest, and in the other a lump of burnt clay."

From Melbourne Mr. G. A. Keartland writes me:—"During the journey of the Horn Scientific Expedition in Central Australia, in 1894, several examples of *Gypoictinia melanosternon* were seen soaring overhead at Darwent Creek, the white bases of the primaries showing strongly in contrast with their almost black breasts, but no specimens were secured. I unsuccessfully tried to get near one which was busily engaged in devouring the remains of a wallaby, stopping only now and again to dispute the feast with a dingo, nor was our black-boy more fortunate. Since our return, however, Mr. C. E. Cowle, of Illamurta, sent me a fine egg of this species. Again in North-western Australia the Black-breasted Kite was noted by the members of the Calvert Exploring Expedition in 1897. On Quanbun Station, Fitzroy River, I counted fifty-seven on the ground at one time. They do not frequent the trees like the other Accipitres, except when visiting their nest, but when full of food just stand on the ground like a stump, in which position they remain for hours. It is said they will not eat dead food, but I saw one feeding on a kangaroo I shot the previous day, and sometimes they fall victims to the poisoned carcasses prepared for wild dogs. We did not obtain eggs, but found two old nests."

Mr. C. Ernest Cowle, while resident at Illamurta, Central Australia, wrote me as follows:—
 “I found the large stick nest of *Gypoictinia melanosternon* built out in a thick fork of the lowest lateral branch of a very high Gum tree, near water. I first saw the bird on the nest at sundown on the 12th October, 1896, but the latter did not contain eggs. On the 3rd November I visited it again, and got one slightly incubated egg, which I sent to Mr. Keartland. I do not know if this species lays more than one egg, perhaps an accident happened to one, as the nest was completed early in October. Birds of prey usually lay here from August to the end of October, but I noticed this year they were later than usual.”

The eggs are usually two, sometimes only one, and the occasion referred to by the late Mr. K. H. Bennett is the only instance I have heard of three being taken. There is a remarkably fine series of these handsome eggs in the Australian Museum Collection, five of which are figured on Plate B. XIV. They were all taken during September, October and November, 1884 and 1885, by Mr. Bennett, while resident at Mossgiel, New South Wales, and vary in size, shape, colour and disposition of markings. They are oval or rounded oval in form, a few specimens only having a tendency to be somewhat pointed at the smaller end, the shell being coarse-grained and lustreless. In ground colour they vary from almost pure white to a faint reddish-white and pale buff, which is spotted and boldly blotched with light rust-red, purplish-red, or umber-brown; in some intermingled with other markings of lilac-grey predominating as a rule at one end or the other, where they are confluent and frequently form a large cap, as in Fig. 2 of Plate B. XIV., the remainder of the shell being more sparingly covered with smaller markings of a paler hue. Others have the ground colour almost obscured with stippings, or fleecy markings of light red, as shown in Fig. 5, while a still lighter variety has the almost pure white ground colour sparingly marked with minute freckles and fine short hair lines of purplish-brown. The latter type is the smallest of all the specimens now before me, and measures 2.37 × 1.89 inches; the largest measures 2.6 × 1.97 inches; and the other egg of the latter set 2.53 × 1.93 inches. A set of two measures:—Length (A) 2.61 × 1.93 inches; (B) 2.45 × 1.9 inches. Four eggs measure respectively:—Length (A) 2.38 × 2 inches; (B) 2.59 × 1.85 inches; (C) 2.5 × 1.72 inches; (D) 2.52 × 1.82 inches.

Two nestlings in the Australian Museum Collection, about a month old, taken by Mr. K. H. Bennett, at Mossgiel, respectively on the 24th October and the 6th November, 1885, each being the sole occupant of the nest, are covered with pure white down, short rich rufous feathers appearing on the nape, hind-neck, back, scapulars, and upper wing-coverts; ends of the protruding quill feathers blackish-brown narrowly edged around the tips with light rufous-brown, the short tail-feathers dull purplish-red; on the foreneck, flanks and under tail-coverts a few rufous-brown feathers, and a small patch on the centre of the abdomen cinnamon-brown; “bill dark horn colour, cere bluish, space in front of the eye lead colour, iris clear light brown” (Bennett).

A young bird about six weeks old, taken by Mr. Bennett from a nest near Mossgiel, on the 4th December, 1885, has the general colour above and below rusty-rufous, slightly paler on the head and under parts, some of the feathers on the crown of the head, hind-neck and breast with a narrow blackish central streak, those on the back, scapulars and median upper wing-coverts more broadly centred with black; the greater wing-coverts blackish with rusty rufous margins; quills dark brown, narrowly edged with pale rufous around the tip, the outer webs of some of them having a distinct greyish wash; upper tail-coverts brown with large rusty-rufous tips; tail-feathers greyish edged with pale rufous around their tips, the inner webs of the central pair edged with light fulvous. Wing 10 inches.

The breeding season in New South Wales commences at the latter end of August, eggs being more frequently found in September and October, rarely as late as November, and usually terminating by the end of December, but it would probably be the end of January or even later when the young leave the nest, hatched from the eggs laid early in November.

EXPLANATION OF PLATE B. XIV.

- Figs. 1, 2, 3, 4, 5. *GYFOICTINIA MELANOSTERNUM*.
Black-breasted Kite.
- Figs. 6, 7, 8, 9. *PANDION LEUCOCEPHALUS*.
White-headed Osprey



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EXPLANATION OF PLATE B. XV.

- Figs 1, 2, 3. *NISÆTUS MORPHNOIDES*.
Little Eagle.
- Figs. 4, 5, 6. *HALIASTUR SPHENURUS*.
Whistling Eagle.
- Figs. 7, 8, 9. *LOPHOICTINIA ISURA*.
Square-tailed Kite.
- Figs. 10, 11, 12. *MILVUS AFFINIS*.
Fork-tailed Kite.



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HEREWITH is issued Part IV. of Volume III. It contains the remaining portion of the Order Accipitres, the Order Striges, and the commencement of the Order Steganopodes. The figures of eggs, which are of the natural size, were reproduced by the heliotype process at the Government Printing Office, from photographs of the specimens taken under the direction of the Government Printer and the supervision of Mr. A. E. DYER. As in the previous Parts, the illustrations of birds are reproduced from drawings made by the late Mr. NEVILLE CAYLEY, who was also responsible for hand-colouring the Plates of Eggs in the coloured copies.

R. ETHERIDGE,

AUSTRALIAN MUSEUM, SYDNEY,

CURATOR.

26th June, 1912.

Genus ELANUS. *Sarigny.*

Elanus axillaris.

BLACK-SHOULDERED KITE.

Falco axillaris, Lath., Ind. Orn., Suppl. I., p. ix. (1801).

Elanus axillaris, Gould, Bds. Austr., fol. Vol. I., pl. 23 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 53 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 338 (1874); *id.*, Handl. Bds., Vol. I., p. 270 (1899).

ADULT MALE.—*General colour above light grey, paler on the hind neck and nape; lesser and median upper wing-coverts black, the greater wing-coverts, secondaries, and scapulars light grey like the back, the primaries grey with dark brown shafts, their under surface blackish-grey; tail white, the central feathers washed with grey; feathers above the eye black; part of forehead, sides of face and neck, and all the under surface and under tail-coverts pure white; under wing-coverts white, the lower outer series blackish; bill black; cere yellow; legs and feet yellow; iris red. Total length in the flesh 13.5 inches, wing 11.6, tail 6.2, bill 0.8, tarsus 1.5.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

AS pointed out by the late Dr. R. Bowdler Sharpe in his "History of the Collections contained in the Natural History Departments of the British Museum."* Latham's description of this species is founded upon one of Watling's pictures, now in the British Museum, and which becomes the type of Latham's Axillary Falcon, and equals the *Falco axillaris* of Latham's "Index Ornithologicus."

Although distributed in favourable situations over the greater portion of Australia, it is seldom observed in the extreme north-western and northern portions of the continent. Nowhere is it so abundantly distributed as the south-eastern parts of Queensland, and the coastal districts of New South Wales. It is nomadic in habits, its appearance generally being governed by the food supply, visiting certain districts for the purposes of breeding, sometimes with unvarying regularity for several seasons in succession, and then being absent again for years. During the breeding season it is usually met with in pairs, but in the inland portions of Queensland and New South Wales it sometimes appears in vast flocks, following the hordes of field rats and mice that make their appearance in certain districts, the latter being a sure concomitant of the other. In the Australian Museum Collection there is a large number of skins, chiefly from the coastal districts and contiguous mountain ranges of Eastern New South Wales. It is seldom seen now anywhere near Sydney, although there are specimens procured at Petersham in the collection, and it has been found breeding farther afield in the Hawkesbury River District, on the outskirts of the County of Cumberland. It was met with during the journey of the Horn Scientific Expedition in Central Australia, in 1894, and Mr. Tom Carter, while resident at Point Cloates, and near what may be regarded as the southern boundary of North-western Australia, noted its appearance in great numbers during the great drought of 1891, many in an emaciated condition; some were picked up dead, and it was not seen again until 1900. In Queensland, Mr. John Ramsay noted this species breeding for several years on the Lindah Estate, Mary River, and where in November, 1877, he succeeded in obtaining a set of three eggs from a nest placed in the topmost forked branches of a *Flindersia*, his brother, Dr. E. P. Ramsay, subsequently describing this set of eggs at a meeting of the Linnean Society of New South Wales.

* Hist. Coll. Brit. Mus., Bds., p. 110 (1906)

The stomachs of an adult male and an immature female procured at Singleton, New South Wales, contained the remains of field mice; of an adult female, obtained at Bundanoon, the remains of insects, principally locusts, and also lizards.



CLIMBING TO A BLACK-SHOULDERED KITE'S NEST.

Mr. Frank Hislop sends me the following note from the Bloomfield River District, North-eastern Queensland:—“The Black-shouldered Kite is only found in the forest land, and is generally seen in pairs. I think they breed in the Bloomfield River District, as they are about there nearly all the year round, but I have never found any of their nests. The birds are generally seen on plains, where there are very few trees. They live on mice, lizards and also grasshoppers and other large insects. The native name for them is ‘Cahn calin.’”

From Copmanhurst, on the Upper Clarence River, New South Wales, Mr. George Savidge writes me:—“The Black-shouldered Kite (*Elanus aivillaris*) is, in some seasons, fairly plentiful in the Clarence River District. I have observed it, too, nearer the coast at Maclean; also the flat lands about Ulmarra and Graton, and on the flats at the foot of the Cangai Ranges, about forty miles further inland from here. It appears about Copmanhurst in May, and usually lays in June or July, and leaves again after the young are reared. Three or four eggs are generally laid for a sitting, the nest usually being placed in a thick bushy part of some tall tree. Both birds carry sticks to the nest; they take

hold of the piece of twig they want by either claws or beak, let their weight fall on it to break it off, and fly away to their nest with it; they can build a nest quickly, and soon have

it completed. Large numbers of this very useful bird are shot annually. They feed principally upon mice, lizards and grasshoppers.

Mr. Savidge writing me on the 28th June, 1897, remarks:—"I found a nest of *Elanus avillaris* near South Grafton, on the 15th June, containing two recently hatched young. This year I first noted its arrival in the district on the 7th April. I saw a pair carrying sticks to a nest yesterday, built in the thick bushy top of a long leaning thin branch of a very high Spotted Gum tree. Later on in the evening I saw them hovering over a maize field, descending now and again catching mice; when a bird caught one it would fly with it to the dead limb of a tree, when it was quickly torn to pieces and devoured. Writing again on the 22nd July, 1897, he remarks:—"I found another nest of *Elanus avillaris* building to-day in the leafy top of a Broad-leaved Apple-tree (*Angophora subvelutina*), and not very high up. From the nest I first found, this morning I saw some Crows trying to get the eggs. One of the Black-shouldered Kites was on the nest, and the other was charging the Crows, of which there were at least half a dozen, and trying to drive them away. The Crows persevered for a long time, but I do not think they would get the eggs, as the Kite does not leave the nest while they are about. Subsequently, on the 28th July, Mr. Savidge's Aboriginal successfully scooped three eggs from the nest built in the Apple-tree. Writing in August, 1897, Mr. Savidge informed me that he took a set of four eggs of *Elanus avillaris* on the 4th August; also a set of three on the 20th August, and remarks:—"The place these birds nest in is nearly always in a thick bushy part of the topmost branches of trees. Occasionally they take a long time to construct the nest, a pair that built near my house taking six weeks before the nest was finished. When my black-fellow was climbing to a nest which contained young, one of the old birds hovered over the nest to see that all was right, then settled on a neighbouring tree, puffing out its feathers and uttering a loud clucking noise. These birds are fearless of man, building close to settlers' houses. I have seen them here in previous years, but never so plentiful since 1893."

Mr. G. A. Keartland writes me from Melbourne, Victoria:—"The Black-shouldered Kite (*Elanus avillaris*) is often seen near Melbourne. The adult is a beautiful bird, with its snow-white underparts and slaty-grey back, but the young ones have a rusty-brown wash on the white feathers, which conveys the idea that they have been stained with water from a clay hole. They live principally on mice and grasshoppers, but do not interfere with poultry. In Central Australia I saw them hunting for food amongst the *Triodia*, where small Jerboa, mice and lizards were numerous."

Mr. Tom Carter sends the following note from Broome Hill, South-western Australia:—"The Black-shouldered Kite (*Elanus avillaris*) was very uncertain in its appearance in North-western Australia, several years passing at times without any being observed. During the drought of 1891 many were on the coast, and some were picked up both there and inland, dead, in a very emaciated condition. Considerable numbers of these birds roosted every night for some time in two or three stunted trees near the homestead. The next appearance of this species was in the good (wet) season of 1900, when they were fairly common on the coast and inland, but very shy. A pair of them reared their young in a Wattle-tree, about eight feet from the ground, in one of my paddocks. The ejected pellets below the nest consisted almost entirely of remains (bones and fur) of mice.

The nest is an open and slightly cup-shaped structure, formed of long, thin leafy twigs, chiefly of a Eucalyptus, the eggs usually being deposited on a layer of leaves, an average one measuring twelve inches and a half external diameter, depth six inches, and the inner cup six inches and a half in diameter by three inches in depth. Two I saw while staying with Mr. Savidge at Copmanhurst, in November 1898, and from which Mr. William Griffiths had successfully scooped two sets of three eggs, were built in the leafy topmost branches of Broad-leaved Apple-trees (*Angophora subvelutina*). Another nest near Mr. Savidge's house he

pointed out to me, was built near the top of a Spotted Gum, but the dead branch from which his Aboriginal had scooped the eggs from the nest had snapped off with its own weight during a storm a few days afterwards. These nests were from sixty to eighty feet from the ground. Beneath the trees in which are situated nests of this species, are numerous ejected castings of fur and bones, similar to those found under trees where Owls are breeding.

The accompanying figures are reproduced from photographs kindly taken by Mr. George Savidge, at Copmanhurst, on the 17th September, 1911. The nest, which contained four eggs, was built in a Broad-leaved Apple-tree (*Angophora subvelutina*), about forty feet from the ground, and was procured by Mr. W. Griffiths. Mr. Savidge informs me the structure was oval in shape, outwardly formed of sticks and twigs, the egg cavity being slightly cupped and lined with green Gum leaves.



NEST AND EGGS OF THE BLACK-SHOULDERED KITE.

Externally it measured eighteen inches in length, thirteen inches in width and six inches in depth.

The eggs are usually three, sometimes four in number for a sitting, and vary from oval to rounded oval in form, the shell being close-grained, smooth and almost lustreless. They are of a dull white ground colour, which is more or less obscured with different shades of reddish-chocolate or chocolate-brown; frequently many of the markings overlie one another, and assume a rich reddish-black hue. In some specimens the mark-

ings consist of large confluent blotches and patches of reddish-chocolate, which form a large cap completely covering one end, while the remainder of the shell, with the exception of a few dots, is entirely devoid of markings; in other specimens it may be boldly blotched, revealing here and there the light ground colour. Sometimes one egg of a set has the ground colour entirely obscured with smears and blotches of chocolate-brown, or has the markings almost entirely confined to the smaller end of the shell. A set of three taken by Mr. John Ramsay, on the Mary River, Queensland, in November, 1877, measures:—Length (A) 1·6 × 1·25 inches; (B) 1·72 × 1·25 inches; (C) 1·58 × 1·27 inches. A set of three taken by Mr. George Savidge, at Copmanhurst, Upper Clarence District, New South Wales, on the 28th July, 1897, measures:—Length (A) 1·67 × 1·23 inches; (B) 1·68 × 1·27 inches; (C) 1·63 × 1·28 inches. Another set taken by Mr. Savidge in the same locality, on the 6th August, 1897, measures:—Length (A) 1·64 × 1·26 inches; (B) 1·63 × 1·25 inches; (C) 1·7 ×

1.23 inches. A set of four in Mr. Savidge's collection, taken on the 12th August, 1898, are pure white, and three of them have caps on the thicker end formed of large confluent dark chocolate-red blotches, almost obscuring a third of the shell, the remainder of the surface being sparingly marked with smaller irregular-shaped blotches of a slightly lighter hue; the fourth specimen has a similar cap of markings on the smaller end, the remainder of the shell being thickly spotted and blotched with pale chocolate-red; they measure as follows:—Length (A) 1.61 × 1.22 inches; (B) 1.66 × 1.25 inches; (C) 1.69 × 1.26 inches; (D) 1.6 × 1.25 inches. Of an abnormally marked set of four in the same collection, and taken in the same district on the 14th July, 1907, two have the almost pure white ground colour nearly concealed by a broad band formed of confluent smudges of chocolate-red around the middle of one specimen, and more towards the smaller end of the other, the remainder of the shell being thickly covered with smaller markings of a similar hue; another has a very pale brown ground colour more or less covered over three parts of the shell with irregular-shaped markings of rich umber-brown, the thicker end having only a blotch and two patches of umber black; the remaining specimen is pure white with a few almost invisible dark umber spots sparingly distributed over the shell, and a cluster of small irregular-shaped markings of blackish-umber on one side at the smaller end:—Length (A) 1.63 × 1.32 inches; (B) 1.62 × 1.28 inches; (C) 1.58 × 1.29 inches; (D) 1.67 × 1.28 inches.

Immature birds resemble the adults, but are of a slightly darker grey on the upper parts, most of the feathers of the nape, hind-neck and upper back are largely tipped with pale ochreous-brown, the quills and primary coverts tipped with white, the scapulars and greater wing-coverts also tipped with white and washed with pale ochreous-brown; the median coverts blackish-grey edged around the tip with pale ochreous-brown, the lesser coverts brownish-black, the outer series with whitish margins; tail white, the central feathers strongly washed with grey, as are the outer webs of the remainder, but decreasing in extent towards the outermost on either side; all the under surface white, with a pale ochreous-brown wash to most of the feathers on the foreneck and upper breast. Wing measurement same as adult, 11.6 inches. In another slightly older specimen, with smaller white tips to the quills and scapulars, most of the feathers on the upper parts, except at the tips which are white, are almost a clear pale brown. The wing measurement exceeds that of the adult, 11.75 inches.

In Queensland and New South Wales the usual breeding season commences in June, and continues till the end of December. As before mentioned these birds are nomadic in habits, and after breeding freely in a district one season may not occur again there for several years. Relative to the breeding season on the northern coastal rivers of New South Wales, Mr. Savidge writes me:—"I have taken the eggs of the Black-shouldered Kite in June, July, August and September, and twice in November, and have found young birds as early as June."

Elanus scriptus.

LETTER-WINGED KITE.

Elanus scriptus, Gould, Proc. Zool. Soc., 1842, p. 80; *id.*, Bds. Austr., fol. Vol. I., pl. 24 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 55 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 340 (1874); *id.*, Hand-l. Bds., Vol. I., p. 270 (1899).

ADULT MALE.—*General colour above light greyish-white, passing into almost pure white on the hind-neck and crown of the head; the lesser upper wing-coverts around the bend of the wing white, the remainder and the median series black, the greater series, scapulars and innermost secondaries like the back; the remainder of the secondaries white, their outer webs pale greyish-white; primaries grey, some of the longer ones tipped and externally edged with brown; tail white, the central feathers*

delicately shaded with grey; feathers in front and above the eye black; forehead, all the under surface and under tail-coverts white; under wing-coverts and axillaries black, the outer series of the former white, and the lower ones grey with a dusky wash; bill black, cere yellow; legs and feet yellow; iris red. Total length in the flesh 13.75 inches, wing 12, tail 6.4, bill 0.9, tarsus 1.5.

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—Southern Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

IN general appearance and habits the Letter-winged Kite closely resembles the preceding species, but from which it may be distinguished during flight by the inverted V-shaped black marking on the under surface of each wing lining. It is, however, chiefly confined to the southern half of the Australian continent, over which it ranges from the eastern to western seaboard, but is more abundantly distributed inland than near the coast. Like that species, too, it is nomadic in habits, appearing some seasons in districts where there is an abundant food supply, and then being absent again, perhaps for many years.

Specimens in the Australian Museum Collection were obtained in New South Wales by the late Mr. K. H. Bennett in the Lachlan District, by Dr. E. P. Ramsay at Springfield, by the late Mr. James Cockerell at Lismore, Richmond River, by Mr. Robert Grant on the Bellinger River, and by the late Mr. Henry Newcombe at Randwick, near Sydney. From Victoria there is an adult male procured by me at Moonee Ponds. It was hovering at dusk in a paddock, and descending now and again to catch field mice, with which the stomach was filled.

Like the preceding species, rats, mice and large insects chiefly constitute its food.

The late Mr. K. H. Bennett, while resident at Mossgiel, New South Wales, in 1886, wrote as follows:—" *Elanus scriptus* can only be considered an occasional visitant in this locality. In 1864, when this part of the country was first occupied, it was infested for some months by at least two species of rats, and preying upon them were large numbers of the Letter-winged Kite. Suddenly the rodents disappeared, and with them the Kites. Only one occasion since (in 1870) have these birds appeared in any numbers, and at that time the country was invaded with legions of mice. Since then only a few pairs have visited the district, and remained only a short time, the last I saw being in 1882. I have never known an instance of their breeding here."

Mr. G. A. Keartland writes me from Melbourne, Victoria:—" During the journey of the Horn Scientific Expedition in Central Australia, in 1894, the Letter-winged Kite (*Elanus scriptus*) was met with in pairs near McMinn's Range, and were very numerous at times. They were generally seen flying over the coarse grass and saltbush, searching for rats and mice, lizards and grasshoppers, which abound in the sandhills. Their nests, which are built in the Gum-trees in the gorges, or along the river banks, are built of sticks and lined with leaves.

The eggs are three or four in number for a sitting, oval or rounded-oval in form, comparatively smooth shelled, and the surface dull and lustreless. They are of a faint bluish-white ground colour, which is sparingly spotted and blotched with different shades of brown and rich umber-brown, intermingled with fainter underlying markings of brown and brownish-grey. In some specimens the spots and blotches are confined chiefly to one end or one side of the shell. A set of three taken by Mr. C. Ernest Cowle, at Illamurta, Central Australia, on the 6th September, 1895, measure as follows:—Length (A) 1.78 × 1.42 inches; (B) 1.82 × 1.4 inches; (C) 1.9 × 1.42 inches. Although *Elanus axillaris* and *E. scriptus* closely resemble each other, the eggs of the latter species may easily be distinguished from the former by being more sparingly marked and lacking the rich hues of the bold and heavily blotched eggs of the Black-shouldered Kite.

In Central Australia, August and the three following months constitutes the usual breeding season of this species.

Sub-family FALCONINÆ.
Genus BAZA, Hodgson.

Baza subcristata.

CRESTED HAWK.

Lepidogenys subcristatus, Gould, Proc. Zool. Soc., 1837, p. 140; *id.*, Bds. Austr., fol. Vol. I., pl. 25 (1848).

Baza subcristata, Gould, Handbk. Bds. Austr., Vol. I., p. 56 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 357 (1874); *id.*, Hand-l. Bds., Vol. I., p. 271 (1899).

ADULT MALE.—*Crown of the head and hind-neck dark ashy-grey; a small occipital crest blackish-grey; back, scapulars and innermost secondaries brown: upper wing-coverts and remainder of the quills dusky-grey, the latter with a faint greenish gloss with blackish cross-bars and tips, which are more distinct on the under surface of the wing, where the interspaces are light grey; tail dark grey crossed with a broad blackish terminal band, the basal portion with the remains of blackish cross-bars; under surface of the tail feathers light ashy-grey, rendering the remains of the blackish cross-bars and broad terminal band more distinct: sides of the head, throat and fore-neck ashy-grey: remainder of the under surface dull white washed with rufous-buff, and crossed with broad well defined blackish-grey bands, the rufous-buff colour more pronounced on the centre of the abdomen and a narrow edging immediately above and below the blackish-grey transverse barrings: under tail-coverts rich rufous-buff. Total length 17 inches, wing 15.3, tail 9, bill 1.05, tarsus 1.5.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—Northern Territory of South Australia, Queensland, New South Wales.

ALTHOUGH nowhere common, in favourable situations the range of the Crested Hawk extends throughout a portion of Northern Australia, and the whole of the coastal



CRESTED HAWK.

districts of Eastern Australia as far south as the Bellinger River in New South Wales. In the Northern Territory of South Australia Mr. George Masters has recorded specimens obtained near Port Darwin, by the late Mr. Edward Spalding. The late Mr. J. A. Thorpe procured specimens at Cape York in 1867, Mr. E. A. C. Olive obtained examples at Cooktown, Mr. Frank Hislop noted it further south in the Bloomfield River District, Messrs. E. J. Cairn and Robt. Grant procured specimens near Herberton and in the Bellenden Ker Range, while collecting on behalf of the Trustees of the Australian Museum. Mr. George Masters obtained examples at Gayndah, on the Burnett River, and Mr. H. G. Barnard has found it breeding on many occasions in the Dawson River District. In New South Wales I met with it in the brushes of the Tweed River; it has been obtained by many collectors on the Richmond and Clarence Rivers, and Mr. Robt. Grant obtained a specimen on the Bellinger River.

* Proc. Linn. Soc. N.S. Wales, Vol. II., p. 269 (1878).

This species frequents chiefly the margins of scrubs, and its food consists largely of insects, also small mammals and reptiles. Both Mr. George Savidge and Mr. Robert Grant have recorded the extraordinary aerial performances of the Crested Hawk, somewhat similar to the evolutions of the well-known domestic Tumbler Pigeon.

Writing on the 20th October, 1896, Mr. Savidge remarks:—"I witnessed a novel performance of the Crested Hawk (*Baza subcristata*) to-day. During flight one of these birds, by several sharp flaps of its wings, ascended quite perpendicularly in the air for six or eight feet, then reversing itself came rolling down again for about the same distance. This performance it repeated many times, uttering the while a peculiar note unlike that made by any other species of Australian ACCIPITRES. At times these birds soar very high; I have also seen them pick something off the leaves and branches of trees while on the wing."

Mr. Robert Grant, Taxidermist of the Australian Museum, has handed me the following notes:—"I found *Baza subcristata* in the scrubs of the Upper Bellinger River, near Boat Harbour, while collecting for the Trustees of the Australian Museum, in August, 1892. In the early morning, close to my camp on the river, a large bird used to fly over from the scrub on the opposite side, and in so doing would turn over on its back and strike upwards at some imaginary foe; this it used to do every fifty or sixty yards, all the while uttering a clear whistling cry. I knew it was a bird of prey of some species, so one morning I got into a favourable position and waited for its coming, shot it, and to my surprise, when I picked it up, found it was a Crested Hawk; this specimen is in the Australian Museum Collection. Previous to this I had shot this species on the tablelands near Herberton, North Queensland. We used to find them on the edge of the dense scrubs, but never far in from the forest lands. Among the contents of the stomach of the bird I shot on the Bellinger River were the remains of insects and portion of a bandicoot."

On the 14th November, 1898, in company with Mr. Clarence Savidge, and "Davy," an Aboriginal, I went to Wombat Creek, about seven miles from Copmanhurst, in the Upper Clarence District, New South Wales, and found a nest of the Crested Hawk built on a thin horizontal branch of a Broad-leaved Apple-tree (*Angophora subvelutina*), and held in position by a few nearly upright leafy twigs. It was about sixty feet from the ground, and the tail of the bird, sitting parallel with the branch, could be seen projecting over the side of the nest. We all considered, from the position, that it was a nest of *Pedargus strigoides*. The bird remained sitting while "Davy" chopped steps in the tree, and until he got on a limb a few yards above the nest, when it sat up in the nest and erecting its crest before flying off, revealed a young one just hatched, clothed in pure white down, with unopened eyes, and a chipped egg, which the Aboriginal scooped with a net. While the nest was being robbed the female made frequent dashes at the blackfellow. This nest, a slightly cupped structure, was formed of thin sticks and twigs, and lined on the bottom with Eucalyptus leaves; it measured externally fifteen inches in length by ten inches in breadth and five inches in depth.

From the Bloomfield River District, North-eastern Queensland, Mr. Frank Hislop writes me:—"The Crested Hawk is generally seen round about the hills, and in the forests and scrub. They usually build in a high tree on the edge of the scrub."

With a set of three eggs taken at Coomoboolaroo, Duaranga, Queensland, on the 22nd October, 1892, Mr. H. G. Barnard sent me the following notes:—" *Baza subcristata* builds about here in large bunches of mistletoe, which grow on a species of Eucalyptus locally known as "Gum-topped Box," and it was in one of these bunches that I found the nest from which I took the set of eggs I send you. The nest is composed entirely of small twigs, which are allowed to wither before the eggs, three or four in number for a sitting, are deposited. The nests of this species are usually about fifty feet from the ground, and I have never known of them being laid in twice, a new nest being constructed for each brood; nor have I known the

Crested Hawk to use the deserted nest of another species of ACCIPITRES. The food of the Crested Hawk consists mainly of insects and small lizards. I once found three large green mantis and a small lizard in the nest of a pair which contained three young birds." A set of two eggs was also received from Mr. Barnard, taken by him in the same locality on the 29th October, 1893.

From Copmanhurst, Upper Clarence District, Mr. George Savidge writes me:—"The Crested Hawk (*Baza suberistata*) is sparingly dispersed in the Clarence River District, where it is a resident species, and is a most useful bird, eating large numbers of locusts, beetles, etc. It is frequently shot by the settlers, their utility being quite unknown to most of them. It is a rather late breeder, the middle of October being the earliest I have taken their eggs; November and December are also its laying months. The nest is usually placed in a bushy



NEST AND EGGS OF THE CRESTED HAWK.

bough of some lofty tree, and is a small structure for so large a bird, and can scarcely be seen from the ground beneath. It is made of fine sticks, and lined with green gum leaves. Three eggs are usually laid for a sitting. The accompanying photograph of a nest was taken on Ramornie Station, opposite Copmanhurst, on the 15th October, 1908. This nest measured eleven inches across and about six inches deep, is nearly flat, and contained three eggs. I once found a nest built low down in a Broad-leaved Apple-tree (*Angophora subvelutina*). This is the earliest record I have of taking eggs of *Baza suberistata*, they usually lay in November and December. I have never found more than three eggs, and on two occasions only two incubated eggs. I have taken fresh eggs on the 17th and 26th

November and 4th December, and incubated eggs in January."

The eggs are usually three, rarely four, in number for a sitting, rounded oval in form, some specimens being abruptly pointed at the smaller end; the shell is of a uniform faint bluish-white, unless nest stained, close-grained, dull and lustreless. A set of three taken by Mr. H. G. Barnard on the 22nd October, 1892, at Coomooboolaroo, Duaringa, measures:—Length (A) 1.77 × 1.4 inches; (B) 1.73 × 1.38 inches; (C) 1.71 × 1.4 inches. A set of three eggs in Mr. George Savidge's collection, taken by him at Copmanhurst, from the nest here figured, measures:—(A) 1.69 × 1.4 inches; (B) 1.71 × 1.39 inches; (C) 1.67 × 1.37 inches; the latter specimen has several yellowish and yellowish-grey nest stains. An unusually small sized set taken by Mr. W. H. Barnard at Keilambete, Central Queensland, in November, 1891, measures:—Length (A) 1.52 × 1.25 inches; (B) 1.55 × 1.24 inches.

Young birds resemble the adults, but have the wings and tail-feathers pale greyish-brown, rendering the darker barrings on the quills and tail-feathers more conspicuous; the apical portion

of the feathers on the nape blackish-brown, with large white bases to the feathers on the hind-neck: sides of the head and ear-coverts grey; chin and upper throat ashy-white, gradually passing into a pale ashy-grey on the foreneck and chest and slightly washed with buff, most of the feathers having narrow blackish shaft-streaks; remainder of the under surface dull white, slightly washed with buff, and narrowly barred with rufous-brown: the centre of the abdomen buffy-white; under tail-coverts pale buff. Wing 12.9 inches.

In Queensland and New South Wales October and the four following months constitute the usual breeding season of this species.

Genus FALCO, Linn.

Falco melanogenys.

BLACK-CHEEKED FALCON.

Falco melanogenys, Gould, Proc. Zool. Soc., 1837, p. 139; *id.*, Bds. Austr., fol. Vol. I., pl. 8 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 26 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 385 (1874); *id.*, Hand-l. Bds., Vol. I., p. 274 (1899).

ADULT MALE.—*General colour above, including the scapulars and secondaries, dull bluish grey with blackish cross-bars and shafts to most of the feathers, which are more distinct on the rump and upper tail-coverts, the barrings on the upper back broader: upper wing-coverts like the back, the median series with narrow dull bluish-grey margins, and which are almost entirely lost on the lesser series: remainder of quills black with a greyish wash on the outer webs of the primaries, their inner webs barred with buffy-white: the inner primaries and outer secondaries with whitish edges around the tip: tail dull bluish-grey with blackish cross-bars, the subterminal one the broadest, the barrings on the central pair broken in the centre, and the ends of all bluish-ashy-white; forehead, crown and sides of the head, nape, cheeks and ear-coverts black: throat pale creamy-buff, passing into deep creamy-buff on the foreneck where some of the feathers have a narrow black central streak: remainder of the under surface creamy-buff, richer in colour on the centre of the breast, paler on the sides of the body, abdomen, thighs and under tail-coverts, which are washed with grey and crossed with narrow transverse black lines: acillaries of a clearer buffy-white, rendering the slightly broader black cross-bars more distinct: "bill at base bluish-green, black at the tip; legs and feet yellow; iris, hazel"* (Bennett). *Total length in the flesh 15.75 inches, wing 11.6, tail 6, bill 1, tarsus 2.*

ADULT FEMALE.—*Resembles the male but is larger, with less dull bluish-grey on the upper parts, and richer in colour on the under parts, the centre of the breast being of a rufous-buff, and less of a greyish wash to the sides of the body, abdomen and under tail-coverts, in some specimens it is entirely wanting, and the blackish cross-lines are more irregular and broken in the centre of the breast. Wing 13 inches.*

Distribution.—North-western Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia, Islands of Bass Strait, Tasmania.

◉ MITTING its extra Australian range, the Black-cheeked Falcon, our most courageous bird of prey, is in favourable situations distributed over the greater portion of the continent, and likewise inhabits the larger Islands of Bass Strait and Tasmania. The late Mr. T. H. Bowyer-Bower procured this species at Derby, and Mr. G. A. Keartland near the junction of the Fitzroy and Margaret Rivers, in North-western Australia. On the opposite side of the continent Mr. Kendal Broadbent observed it on the Upper Fitzroy River, in Central Queensland. Dr. E. P. Ramsay also records it from Port Denison and Wide Bay. In suitable localities it occurs sparingly throughout the length and breadth of New South Wales, frequenting chiefly the rocky headlands and rugged mountainous districts of the State. The late Captain

Sturt recorded it from the Depot on Evelyn Creek, between Milparinka and Tibooburra, over six hundred miles inland. Mr. George Savidge has found it breeding on many occasions in the Upper Clarence District, in north-eastern New South Wales, and the late Mr. K. H. Bennett obtained both birds and eggs in the Wilcannia District, in the south-western portion of the State. In the Australian Museum Collection there are, among others, examples procured by Dr. E. P. Ramsay, at Ashfield, near Sydney, by Mr. C. H. Linklater at Glenfield, twenty-six



BLACK-CHEEKED FALCON.

miles south of the metropolis, Mr. Ashton Clark presented a specimen obtained at Bulga, one hundred and sixty-five miles north of Sydney. An adult male was received from Mr. Robert Grant, procured by him at Lithgow, on the Blue Mountains, ninety-five miles west of Sydney, and one from Mr. H. Blaxland, obtained at Cowra, two hundred and twenty-three miles west of the metropolis, and Mr. R. G. Hays sent a specimen from Uralla, in the New England District. South it occurs throughout Victoria and South Australia, Dr. A. M. Morgan recording it from the latter State at Laura, on the Rocky River, north of Adelaide, and there is a specimen in the Australian Museum Collection procured by Mr. G. Masters at Port Lincoln, in November, 1865. Mr. E. D. Atkinson has found it breeding on the islands of Bass Strait and the North-western Coast of Tasmania, and in the latter locality

Dr. Lonsdale Holden obtained its eggs. Gould remarks in referring to *Falco melanogenys*:—"Gilbert states that he has seen the Australian bird carry off a *Nyroca australis*, a species at least as heavy again as itself. To say, therefore, that this bird could not be trained and brought into use in the science of falconry, would be to affirm what would probably prove to be untrue were the experiment made. Let the Australians, then, bestow some care on this fine bird, and not, as they are doing with the Emu and the Bustard, let it be entirely eradicated from the fauna of the country. When I visited the colony in 1839, it was universally dispersed over the entire southern portion of Australia and Tasmania."* Gould's fears that this species may be entirely extirpated, are as far as New South Wales is concerned, I think groundless. It is certainly rare now near the metropolis, as many other species are, in comparison with what they were in 1839, but it is still evenly distributed, in suitable localities, over the whole State. Mr. G. Savidge has noticed that in the Upper Clarence River District it is not so common as it was ten or twelve years ago, but this is accounted for by the closer settlement of the country, and the consequent shooting of these birds for the depredations they commit in poultry yards. In November, 1898, I saw near Wombat Creek the nesting place of this species in some cliffs, where Mr. Savidge had, on many occasions, taken their eggs; and at another breeding place in the district he was informed by an old resident that it had been constantly used for over thirty years.

Bold and courageous are these birds in the pursuit of their prey. Not only do they capture and carry off ducks and fowls, but Mr. Savidge informs me one actually chased one of his pigeons under the verandah in which he was standing, but failed to secure it. Moreover they

* Handbk Bds Austr, Vol. i., p. 27 (186)

will hunt in a pure spirit of mischief to worry, or harry, or kill, as will be seen both by Mr. Savidge's and Mr. Grant's notes. At the Nobby's, Phillip Island, Western Port, Victoria, a pair of Black-cheeked Falcons used to feed largely on *Endyptula undina*, and I have also known them to feed upon various species of water-fowl. The stomach of a specimen procured on the 26th May, 1900, at Glenfield, contained the remains of a *Platycecus eximius* and a male *Pachycephala gutturalis*.

From Copmanhurst, on the Upper Clarence River, New South Wales, Mr. George Savidge writes me:—"The Black-cheeked Falcon (*Falco melanogenys*) is sparingly dispersed over the Upper Clarence River District. I saw a solitary specimen at Yamba, Clarence Heads, where I thought it quite in its element; a strong wind was blowing at the time, and it was flying low amongst the numerous Gulls and other sea birds, upon which it no doubt preys. I did not



NESTING PLACE AND EGGS OF THE BLACK-CHEEKED FALCON.

observe it after any quarry there, but it seemed to be able to pass by the numerous birds quite easily. For power of wing and magnificent flight this fierce bird easily takes the palm of all the ACCIPITRES inhabiting this part. I have been spell-bound when this bird has suddenly, and without warning, made its swoop close to me. To hear the rushing sound as it dashes through the air with folded wings after ducks or pigeons, is worth going a long way for. The male is a much smaller bird than the female, but equally as daring. I have watched them chase my pigeons

until they became mere specks in the sky; at last the Falcon reaches them, or perhaps they head down to try to pass their pursuer (hard to decide at such a distance). I watched one make two unsuccessful swoops; he missed the bird twice, but at the third attempt the pigeon was seized and carried away. Upon one occasion at our local pigeon match a Falcon suddenly appeared and seized the pigeon, which had been liberated from one of the traps and had been shot. It carried the pigeon away across the river, amidst the shouting of the many people assembled at the match. Usually they take them to the branch of a tree or on the ground to devour their meal. In May, 1909, a neighbour shot a Falcon which had seized a full grown fowl, and was tearing it to pieces. I have also witnessed it strike a full grown fowl down, also Black Duck, and one day saw one chase a Black Cockatoo, which it appeared to attack

from pure mischief, returning to the charge several times, but it did not succeed in killing the Cockatoo. They prey a good deal on the Blue Mountain Lorikeet (*Trichoglossus novæ-hollandiæ*), which seems to lose all power when confronted by one of these birds; this Lorikeet does not seem to employ its powers of flight to avoid the Falcon, as it might do. The Rosella (*Platycercus eximius*) makes a much better fight for its life, also the Magpie Lark (*Grallina picata*), for although not quick flying birds they are expert dodgers. I saw a Black-cheeked Falcon chase a single Black Duck within ten yards of me. I fired at the Duck, and shot just behind it, the Falcon being about six feet behind; another second and he would have had him. The Black-cheeked Falcon constructs no nest whatever, but makes a light depression in the sand and crumbling debris on the shelves of rocks. In the year 1896 I robbed one pair of birds three times, viz., three eggs on the 16th August, three eggs on the 13th September, and two eggs on the 14th October. My aboriginal collector told me they reared young ones in the same place often; when robbed they usually remove from one shelf of rocks to another. Their home here is in the mountainous districts, and the nesting place is guarded by precipitous rocky walls, utterly forbidding, in almost every case, access by man from below, and not always to be reached safely from above, even with rope ladders. Upon one occasion the Falcons knocked the hat from the head of an aboriginal, making repeated swoops and charges when he was taking their eggs, screeching out loudly the while. One of us generally sat on top and kept waving sticks and handkerchiefs to keep them away. It is with regret I add that these noble birds have been almost entirely exterminated in these districts. They were such daring and constant visitors to the poultry yards, that they were easily shot; however, I visit their old nesting places every year in the hopes of others coming and occupying their solitary homes. This bird is, I think, very much like the English Peregrine Falcon; it has many of its characteristics. The Peregrine and the Goshawk many English noblemen are trying hard to re-introduce again, and are most rigidly protected on many estates."

The figure on the opposite page, also on Plate A. 15, are reproduced from photographs taken by Mr. Savidge.

Mr. Robert Grant, Taxidermist of the Australian Museum, has given me the following notes:—"I found *Falco melanogenys* nesting in a deep gorge about three miles from Lithgow, on the Blue Mountains, New South Wales, in October, 1883. The nesting site was on a shelving or projecting rock right under a large overhanging rock, between twenty and thirty feet from the top, and about eighty to a hundred feet from the bottom of the cliff. It was impossible to reach the nesting-place either from above or below, so my brother and I left one day with the intention of securing both birds. My brother went on one side of the gorge opposite to the nesting-site, while I stood immediately beneath it, so that we would have a better chance of shooting the birds which ever way they came; the day was cloudy with a strong wind blowing down the gorge. We had not been long there when in the distance we heard the cawing cry of a Crow, as it came flying up against the wind, and a little higher than the Falcon's nesting-place. As it came in line with the latter, one of the Falcons dashed out like a flash of lightning and struck the Crow, which fell to the ground like a stone, and then the Falcon returned to its nesting-place; so it certainly did not kill it for food. The whole action of the bird in protecting its nest from a cunning foe, so impressed my brother and I, that we left the birds in peace to rear their young."

The late Mr. K. H. Bennett wrote as follows while resident in the Mossgiel District, New South Wales:—" *Falco melanogenys* is very rarely met with in this locality, preferring heavily-timbered and rugged mountainous country. Like all true Falcons it captures its prey on the wing, and is very destructive amongst Quail. It is a bold and fearless bird, and will suffer itself to be approached closely, nodding its head in a defiant manner at the intruder before taking to flight. I have never known it to breed here, but found the nesting-place on the 9th September,

1885, at Mount Manara, between the Lachlan and Darling Rivers, and some seventy miles from the latter stream. The eggs, three in number, were simply placed on the soft mould at the bottom of a deep fissure in the face of a precipitous cliff. Whilst climbing the cliffs I was fiercely attacked by both of the birds." Mr. Bennett took a single fresh egg from the same nesting-place in October, 1886, but when the birds were disturbed again by his climbing to it they abandoned it, nesting again on an overhanging rock, but completely out of reach.

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray writes :—
 “*Falco melanogenys* is sparingly found throughout the whole district, preying mostly on birds of various kinds, from Ducks to Budgerigars, all killed on the wing, as is the manner of Falcons in general, by a lightning-like swoop and blow with the hind claw. This and the little Grey Falcon are a great trouble to the professional bird catcher, as they continually take his call birds, and he often nets the Falcons and kills them. I have no note of the nesting of this Falcon, though I have had young birds not long from the nest brought to me by a bird-catcher. Mr. W. McLennan, when at Casterton, Victoria, went out on the 28th October, 1909, to look up a nesting hollow of these birds from which he had taken young birds some years previously; he found the hollow, in a large Red Gum, contained two nearly fully fledged young birds, as big as Brown Hawks, with bill horn colour tipped with black, iris yellow, legs yellow, crown of head and cheeks black, back dark brown, all the under surface rufous with brown cross-bars. From the feathers and castings in the hollow they were evidently being fed upon Musk and Little Lorikeets.”

From Melbourne, Victoria, Mr. George A. Keartland writes :—“The Black-cheeked Falcon is certainly the boldest of our ACCIPITRES, and, with the exception of the Little Falcon, the fastest flyer. I have seen one carry away a wounded pigeon which it captured within a few yards of where a pigeon shooting match was in progress. In North-western Australia it is known as the ‘Snake Hawk,’ owing to its energy in pursuit of these reptiles. One that I disturbed from the ground at Melton, Victoria, had killed and partly eaten a tiger snake three feet nine inches long. Although the reptile was still moving, the flesh was torn from the bone for about ten inches of its length. All the specimens I have dissected had been feeding on grasshoppers. At Melton and Bacchus Marsh, Victoria, it is frequently seen in pursuit of domestic pigeons and poultry. It is very persistent and daring when so engaged, and will wait for an hour in hopes of securing a bird which it has wounded but lost. In North-western Australia they are numerous near the Fitzroy River. When grasshoppers are plentiful these Falcons will feast upon them until almost too gorged to fly.”

From Adelaide, South Australia, Dr. A. M. Morgan writes :—“*Falco melanogenys* is fairly common in the southern parts of South Australia. I have not met with it north of Laura. They were rather numerous there, and made havoc of the pigeon lofts; a bird which I dissected contained a whole pigeon, including the beak, feet, and a considerable number of the feathers. It was shot by the owner of the late pigeon, who had seen the Falcon kill and carry off his bird. I have never succeeded in finding a nest.”

Mr. Malcolm Harrison sends me the following notes from Hobart, Tasmania :—“The Black-cheeked Falcon (*Falco melanogenys*), although not numerous, occur in odd pairs about this locality, and nest in the high cliffs in the Mount Faulkner Range. Mr. A. E. Brent informs me that a pair frequents the vicinity of Bridgewater, and large toll is taken of the Carrier Pigeons on their return to Hobart, this locality being in the line of flight of birds liberated at any Tasmanian Railway Stations to the north. Quite a long record of their kills has been kept by Mr. Brent, who, however, recently avenged the death of numerous pigeons by taking a fine set of the Falcon's eggs from a difficult position in the neighbouring cliffs. The act of striking seemed to be carefully timed for the moment that the pigeon gained the land after crossing the mile or so of water presented by the Derwent River at this point.”

From notes made by Dr. Lonsdale Holden while resident at Circular Head, on the North-west coast of Tasmania, I have extracted the following:—"On the 25th September, 1886, I saw a pair of *Falco melanogenys* were nesting on the sheerest part of the sea-face of Circular Head Bluff, about a quarter of the way down the precipice, and I climbed along a ledge which reached within ten yards of the crevice in which they were breeding. The birds flew screaming about me, dashing straight towards me and then sheering off when within a few yards. From time to time they perched on points of rock and sat watching me, and occasionally would sail along the cliffs like a swallow. Last autumn and winter the birds were flying about Circular Head, and were generally observed returning to these cliffs in the evening very high in the air, and announcing their presence by screams, which are like the noise a slate pencil makes on a slate, or a railway carriage wheel tightly broken dragging along a rail. At times I have seen them flying in an aimless manner at a great height from the ground, like a hawking Swallow. They dip during the last few yards of flight, and sail gently upwards just before they alight. On the 16th September, 1887, I found the Black-cheeked Falcons nesting in the same place on Circular Head Bluff as the previous year. I saw one bird twice fly screaming to the crevice, where he was received with chuckling screeches, and immediately sail out again. I believe the male was feeding his incubating mate, but could not see if he carried any prey in his claws as he flew in. I saw two of these birds mobbing a White-bellied Sea-Eagle on the sand-hills between East Inlet and the sea. I took two incubated eggs on the 4th October, 1888, from a nesting-place in the cliffs near the coast. The two birds kept flying at my face and uttering loud screams as I sat by the eggs, first from one side and then the other, making short circuits in the air and then dashing down. They came very close, not arm's length but hand's breadth of me, though I struck repeatedly at them. They even followed me when I retreated among the *Banksia* trees close at hand and sat down to pack the eggs. Compared with Circular Head Bluff these rocks, where this pair bred, which were only about sixty feet high, scarcely deserved the name of cliffs at all. On the 26th September, 1891, I took a set of three incubated eggs from the same nesting-place, but the birds were not at hand, although I saw one swooping about a long way off. In September, 1893, the pair of birds at Circular Head Bluff nested again in the same inaccessible spot."

Mr. E. D. Atkinson, of Waratah, Mount Bischoff, Tasmania, writes me as follows:—" *Falco melanogenys*, like *Halictus leucogaster*, breeds at intervals along our coast, also on the adjacent islands, but never in trees so far as my experience goes. On the 9th October, 1886, I took three hard set eggs from a ledge of rocks on the highest part of Stacks Island, West Bass Strait. And on the 10th September, 1887, I took two fresh eggs from a secluded ledge of rock on the Sisters' Cliffs, North-west Coast. There was no attempt whatever at a nest; on both occasions the eggs were deposited on the bare ground, with a few bones scattered round. Had I been a week later on the second occasion there would probably have been a third egg in the clutch. I know of no eggs which look more handsome than these, which may be partly owing to their desolate surroundings. They are mottled and marked all over with every shade of reddish-brown. The birds were very bold and aggressive, and I could feel the wind from the wings in my face as they flew screeching past, and this they kept up until I left. When on a collecting trip to Bruni Island some years ago with my brother, the Revd. H. D. Atkinson, we observed a flock of Teal making to the 'Little Lagoon.' They were travelling like a whirlwind, in a slanting direction, for the water, and as they reached it with a great splash, a single bird (*Falco melanogenys*) shot like a rocket some three hundred feet or more straight into the air, and then flew leisurely away. The Teal had won the race, but it was a narrow escape for one of them."

Mr. R. N. Atkinson also writes me of a trip made by him and his father, Mr. E. D. Atkinson:—"We noticed a pair of Black-cheeked Falcons at Walker Island, in the Hunter Group, early in October, 1905. They were flying rapidly over the Islands, and we noticed they

evidently had left their mark on a neighbouring rocky islet, where my father had taken three eggs about twenty years ago. A number of dead White-faced Storm-Petrels were lying about, one quite freshly killed, and all more or less eaten. No doubt their nest was in the vicinity, but we could not find it."

The eggs are usually three, rarely two in number for a sitting, oval or rounded-oval in form, comparatively smooth shelled, the surface being dull and lustreless in some, slightly glossy in others. They are extremely variable in colour, even in the same set, the ground colour ranging from buff to isabelline, and reddish-white to pinkish-white, and the markings different shades of red, brown and reddish-black. A set of three, taken by the late Mr. K. H. Bennett, at Mount Manara, in the Wilcannia District, South-western New South Wales, has the reddish-flesh ground colour almost obscured by numerous freckles, dots and confluent patches of rich reddish-brown; in a few places they are almost black; the ground colour of one specimen is lighter, the markings at the thicker end smaller and more uniform in size, and measure as follows:—Length (A) 2.1 × 1.64 inches; (B) 1.97 × 1.65 inches; (C) 2.1 × 1.57 inches. A set of three taken by Dr. Lonsdale Holden on the north-west coast of Tasmania, on the 4th October, 1888, measures:—Length (A) 2.12 × 1.6 inches; (B) 2.09 × 1.64 inches; (C) 2.17 × 1.62 inches. Another set of three taken by Dr. Holden on the 21st September, 1891, in the same locality, is of an isabelline ground colour, which is almost obscured by minute freckles, dots, spots and irregular-shaped blotches of deep reddish-brown; in one specimen the markings are evenly distributed over the surface of the shell, in the remaining two they are confluent, forming a cap on the larger end of one specimen and on the smaller end of the other:—Length (A) 2.12 × 1.65 inches; (B) 2.17 × 1.65 inches; (C) 2.18 × 1.67 inches. A set of three taken by Mr. George Savidge, in company with his son Clarence, and "Fred" an aboriginal, from some lofty cliffs near Wombat Creek, in the Upper Clarence District, North-eastern New South Wales, on the 30th September, 1895, somewhat resembles the preceding set, but the markings on two specimens are more evenly distributed over the surface of the shell; in the other the ground colour is almost obscured with numerous rich reddish-brown freckles and spots, with which are intermingled a few blotches of a nearly reddish-black hue; in one place on the shell the colour appears as if it had brushed off while wet, and formed a smear:—Length (A) 2.2 × 1.62 inches (this specimen is figured on Plate B xvi., fig. 1); (B) 2.21 × 1.62 inches; (C) 2.19 × 1.67 inches. Another set received from Mr. Savidge, and taken in the same district on the 16th August, 1896, is altogether lighter and smaller, the ground colour being of a faint reddish-pink, one specimen being unevenly marked with freckles and spots of light reddish-brown, with which are intermingled some small blotches of dark reddish-brown; on another specimen the markings are of a richer hue, with an almost perfect band of confluent markings around the centre of the shell; in the remaining one, which is of a decided pinkish-red hue, the markings are larger on the thicker end, except three conspicuous reddish-black blotches on one side, at the smaller end:—Length (A) 1.97 × 1.66 inches; (B) 1.93 × 1.62 inches; (C) 1.98 × 1.63 inches.

Young birds of both sexes are dark brown above, with dull rufous margins to most of the feathers, including the upper wing-coverts; some of the feathers of the rump and the upper tail-coverts having faint ashy-grey cross-bars; tail feathers dark-brown with a greyish wash, and tipped with pale buffy-white, the central pair having darker cross-bars, the remainder barred with rufous-buff, which is more distinct on the inner webs; head, cheeks, ear-coverts and nape dull black, some of the feathers on the nape mottled with reddish-fulvous; all the under parts rufous-buff streaked with black, the feathers on the throat much paler and devoid of streaks. Wing 11.3 inches. An immature male in the Australian Museum Collection resembles the adult on the upper parts, but the entire under surface is dull white, faintly tinged with buff on the breast, where the feathers have heart-shaped black spots, and the thighs barred with black,

some of the feathers on the foreneck and upper breast creamy buff, and where many of the feathers have narrow black central streaks. Wing same as adult male, 11·6 inches. An immature female is duller in colour on the upper parts, and the bluish-grey and blackish-brown bars are less distinct, and the scapulars and upper wing-coverts are narrowly edged with light rufous-brown: on the under parts it is richer in colour than the adult, for it is destitute of the neutralising grey wash to the feathers on the lower sides of the body and abdomen. Wing 12·5 inches.

August until the end of December constitutes the usual breeding season of this species in Eastern Australia. In North-eastern New South Wales Mr. G. Savidge has taken eggs from August until the end of October. The duration of the breeding season depends very much on whether the birds are molested or not, for on several occasions Mr. Savidge has robbed the same pair of birds three times in a season, and then allowed them to rear a brood; he has, however, taken more eggs in August and September than in October. In South-western New South Wales the late Mr. K. H. Bennett took eggs in September and October, and during the same months Mr. E. D. Atkinson and Dr. L. Holden have taken them on the islands of Bass Strait and on the north-west coast of Tasmania.

Falco hypoleucus.

GREY FALCON.

Falco hypoleucus, Gould, Proc. Zool. Soc., 1840, p. 162; *id.*, Bds. Austr., fol. Vol. I, pl. 7 (1848); *id.*, Handbk. Bds. Austr., Vol. I, p. 24 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I, p. 394 (1874); *id.*, Handl. Bds., Vol. I, p. 271 (1899).

ADULT MALE.—*General colour above bluish-grey, each feather having narrow blackish shafts; upper wing-coverts like the back, some of the greater series and the secondaries with the remains of indistinct brown cross-bars; remainder of quills blackish-brown, their inner webs toothed with greyish-white, and finely freckled with brown; upper tail-coverts and tail-feathers bluish-grey, barred with blackish-grey, more distinct on the latter; feathers of the forehead, crown of the head and nape slightly darker grey than the back, with conspicuous black shaft-lines; a narrow line of feathers, partially encircling the bare skin around the eye, black; all the under surface very pale bluish-grey, all the feathers with fine black shaft-lines, less distinct on the throat; the under tail-coverts greyish-white, with the remains of slightly darker grey cross-bars; under wing-coverts almost pure white, some of them with narrow blackish shaft lines; bill fine bluish-black, darker at the tip, its base orange; cere and skin around the eye yellow; legs and feet rich orange; claws black. Total length in the flesh 14·5 inches, wing 11·5, tail 6, bill 0·9, tarsus 1·8.*

ADULT FEMALE.—*Similar in plumage to the male, but slightly larger. Wing 12·6 inches.*

Distribution.—Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

THE Grey Falcon is widely distributed over the Australian continent, but appears to be nowhere common. Gould described it in the "Proceedings of the Zoological Society," in 1840, from a specimen given to Gilbert in Western Australia, the latter also procuring this species himself in the vicinity of Moore's River. A male and female were procured by Captain Charles Sturt's "Expedition into Central Australia," at the Depot on Evelyn Creek, midway between Milparinka and Tibooburra, in North-western New South Wales, *Falco melanogenys* and *F. subniger* also being obtained in the same locality. In the "Proceedings of the Zoological Society" for 1875, Dr. E. P. Ramsay, writing on the birds of North-eastern Queensland, remarks:—" *Falco hypoleucus* was met with by Inspector Robert Johnstone of the Herbert River,

* Proc. Zool. Soc., 1875, p. 579

on the table-lands due west of Cardwell, and on the ranges thereabouts; Mr. J. B. White, of Springsure, due west inland from Rockhampton, likewise noticed it, and was fortunate enough to obtain several specimens." Subsequently Dr. Ramsay received from the latter gentleman an adult male and female shot at the nest, together with their eggs, which he afterwards described in the "Proceedings of the Linnean Society of New South Wales," the nest being "like that of an *Hieracidea*, composed of sticks and twigs, and placed on an horizontal bough." It is extremely rare in New South Wales, and was never met with by that excellent observer, the late Mr. K. H. Bennett, during his long residence in the Central and Western Districts of the State. In September, 1881, Mr. E. H. Lane noted the Grey Falcon on Wambangalang Station, in the Dubbo District, for the first time, where it remained to breed, and Messrs. J. D. Cox and A. G. Hamilton, in a "List of Birds of the Mudgee District,"† record three specimens procured respectively at Springfield, Mudgee and Cullenbone. During the journey of the Horn Scientific Expedition in Central Australia in 1894, several birds were seen near the Levi Range, but were all too wary to approach, as were several others observed by Mr. G. A. Keartland while a member of the Calvert Exploring Expedition in Western and North-western Australia in 1896-7. On the 11th September, 1895, Mr. Ashton Clark presented an immature male to the Trustees of the Australian Museum, which he had shot the previous day at Bulga, one hundred and sixty five miles north of Sydney. This locality is the nearest to the coast I have known this species to occur, and it was probably driven from the inland districts by the then prevailing drought, another inland species, *Lophoictinia isura*, being received the previous day from Carlingford, seventeen miles north-west of Sydney.

Adult specimens obtained in widely separated localities show but little variation, a brownish wash often, however, pervades some of the feathers of the upper parts, and even in those birds in breeding plumage. There is not a young bird in its first plumage in the Australian Museum Collection, but there are several in a transition stage from youth to maturity. A young one obtained by Mr. J. B. White at Springsure, Queensland, in 1873, has some of the feathers of the head and back, and many of the upper wing-coverts brown or partially brown, as are also the margins of the outer webs of the inner secondaries; tail feathers brown banded with greyish-brown, three new central tail feathers about half grown, bluish-grey with greyish-black bands, their bases yet encased in sheaths; on the under surface it resembles the adult, but many of the feathers on the breast are white, having a blackish-streak in the centre of the apical portion in addition to the blackish shaft lines. Wing 10·7 inches.

Captain Sturt remarked:‡—"The Grey Falcon (*Falco hypoleucus*) was shot at the Depot (North-western New South Wales), at which place, during our long stay, Mr. Piesse, my storekeeper, was very successful with my gun. A pair, male and female, were observed by him one Sunday in May, whilst the men were at prayers, hovering very high in the air, soon after which he succeeded in killing both. They came down from a great height, and pitched in the trees on the banks of the creek, and on Mr. Piesse firing at and killing one the other flew away; but returning to look for its lost companion, shared its fate. Nothing could exceed the delicate beauty of these birds when first procured. Their large full eyes, the vivid yellow of the cere and legs, together with their slate-coloured plumage, every feather lightly marked at the end, was quite dazzling; but all soon faded from the living brightness they had at first. These two specimens were the only ones seen during an interval of seventeen months that the party was in the interior, and these, it appears probable to me, were on the flight, and were attracted down to us."

Mr. Thos. P. Austin, of Cobborah Station, Cobborah, New South Wales, informed me that one of these birds remained in the vicinity of the homestead during August and September,

* Proc. Linn. Soc. N. S. Wales, Vol. VII., p. 414 (1883).

† Proc. Linn. Soc. N. S. Wales, Vol. IV., 2nd Ser., p. 398 (1890).

‡ Exped. Centr. Austr., Vol. II., App. p. 13 (1849).

1909, and had captured at various times about a dozen of his domestic pigeons, but he refrained from shooting it, as he thought there might be a possibility of another bird taking up its quarters there and the pair breeding. A very interesting immature male was received in the flesh by the Trustees of the Australian Museum from Mr. G. E. Driffield, of Condoblin, New South Wales. It was shot the previous day, in the presence of the donor, by Mr. A. P. Cox, of the Australian Joint Stock Bank. Around the middle toe of the left foot, and near the claw, was tightly closed the bill and dried skull of a Barnard's Parrakeet (*Barnardius barnardi*). Apparently the latter, when caught, had fastened on to the toe of its captor, which it securely clenched in its death struggles; evidently it had been carried about by the Falcon for a long time, for the skull was bare and the skin, with only a few feathers remaining, was dry and shrivelled.

From Orange, New South Wales, Mr. E. H. Lane writes me:—" *Falco hypoleucus* made its appearance on Wambangalang Run in 1881, no doubt driven in by the great drought of that time, and being, so far as I have heard, its first and only visit to the Dubbo District. The nest was built in September, and contained two fresh eggs, one of which the young fellow who climbed the very lofty tree, broke in coming down, so I have only the odd egg, which I prize."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray writes:—" Some few years ago a bird-catcher brought me a pair of young Grey Falcons (*Falco hypoleucus*). They soon became very quiet and tractable, and remained so, their disposition contrasting with that of three Black-cheeked Falcons which I had in an adjoining cage. These latter birds never made friends with me, and I let them go. The Grey Falcon is sparingly dispersed throughout the district, several pairs coming under our observation during our out-back trip in September, 1909. The first pair we found nesting on Gardiner's Creek, about fifty miles north from Broken Hill, on the 13th September. As we were going up the creek the female first flushed from her nest in a tall tree, then the male from a smaller nest lower down, where he had evidently been sheltering from the wind. The real nest, a large loosely built structure, after the style of a Raven's, was placed on a small limb at the very top of the tree, sixty feet from the ground. On account of the size of the limb it was difficult of access, but Mr. W. McLennan, by careful climbing, managed to take a clutch of three fresh eggs from the nest, which was lined with wool. On the 15th September we found another nest of this species on Sturt's Meadow's Creek, just below the homestead, placed as before on a thin limb at the very top of a Gum-tree; as it was evening when we found it, and our camp was only a few hundred yards away, we left it till morning after watching the female settle herself on the nest for the night. In a hollow of the same tree a Cockatoo (*Cacatua sanguinea*) had its eggs. Whilst Mr. McLennan was climbing to the nest early next morning, the two birds sailed uneasily round and round above the tree, but made no attempt to defend their home. The nest was at a height of eighty feet from the ground by measurement. It was as large as a Little Eagle's nest, loosely built of sticks, and lined with wool. Four slightly incubated eggs were in it. The birds uttered no kind of cry at any time. On the same day that we found this nest, off a small creek near the White Cliffs-road we saw another pair of these birds, which had evidently taken possession of an old Wedge-tailed Eagle's nest, in a Leopard-tree, a nesting cavity having been shaped in the old nest, but no eggs laid. Budgerigars were flying at frequent intervals down these creeks, dropping off to breed here and there. Black-breasted and Rufous Song Larks were breeding freely, the former on the plains and the latter in the undergrowth and rank herbage along the creeks; young Barnard Parrakeets were hatching out, soon to be followed by numerous broods of Galahs and Blood-stained Cockatoos, so that the young of the Falcons would not lack food. Another pair were seen on the 24th September, in a Box flat at Langawirra, but had not yet nested. On our return journey, when exploring Yalcowinna Creek on the 10th October, Mr. McLennan and I saw a female Grey Falcon attack, in most vigorous fashion, a Raven which was very glad to escape out on to the plains. We soon found the Falcon's nest, built high up

on a slender leaning branch of a Gum, as near to the top of the tree as possible, sixty feet from the ground. The nest was loosely constructed of twigs and small branchlets, and lined with fine bark, the egg cavity being eight inches in diameter and six inches deep; it contained four eggs in an advanced stage of incubation. As with the others, these birds made no attempt to defend their nest, flying round at a respectful distance. During my trip in September, 1911, I only came across one pair of these birds; they had a nest on Yalcowinna Creek placed as usual on the topmost branch of a Eucalyptus; the nest contained three young birds not long hatched."

Mr. G. A. Kearthland writes me as follows from Melbourne, Victoria:—"The Grey Falcon (*Falco hypoleucus*) is occasionally met with in Gippsland, but I have only shot two, both of which were in quest of chickens at the farms where I was staying. It is more frequently seen in the West Macdonnell Ranges, Central Australia, than any other part I have visited. Still occasionally pairs may be found right across from North-western Australia to Queensland. Although strongly built they are slow fliers, and are usually seen skimming just over the tops of the *Triodia* tussocks, ready to pounce on any lizards, snakes or small animals such as mice, jerboa or rats. When its wants are supplied it usually perches on the highest branch of a dead tree, where it remains until disturbed or hunger necessitates further exertion. Their nests are built of sticks, and closely resemble those of the Brown Hawk, but their eggs are of a light brown colour."

From Adelaide, South Australia, Dr. A. M. Morgan writes:—" *Falco hypoleucus* is a rare bird in the southern parts of South Australia. Whilst at Laura I had three dead birds brought to me, but did not meet with the bird myself or hear of its nesting there. My brother, Mr. E. R. Morgan, took a clutch of two eggs on 31st July, 1899, about one hundred and forty miles north-west of Port Augusta. The bird cannot be common there, as I did not meet with it on my visit to that district in 1900."

Their eggs vary from oval to rounded-oval in form, the shell being comparatively close-grained, dull and lustreless. A set of two taken by Mr. J. B. White on the Upper Thomson River, Queensland, are of a reddish-buff ground colour, which is almost obscured by numerous freckles, dots and small spots of rich rusty-red, the markings predominating and forming an indistinct cap on the larger end of one specimen, and becoming confluent and assuming a reddish-black hue on the smaller end of the other:—Length (A) 2.07 × 1.51 inches; (B) 2 × 1.52 inches. A set of two eggs taken by Mr. C. Ernest Cowle at Hlamurta, Central Australia, on the 6th September, 1895, are very much paler, having the ground colour of a faint yellowish-buff, one specimen being sparingly spotted and blotched with slightly darker shades of the ground colour, intermingled with a few larger irregular-shaped and darker markings of buffy-brown; the other is freckled and spotted and blotched with reddish-brown, which are larger and predominate on the thicker end of the shell:—Length (A) 2.02 × 1.6 inches; (B) 1.97 × 1.56 inches; the latter egg is represented on Plate B. XVI., fig. 3.

Young males in the moult from immaturity to adult exhibit both stages of plumage, and may be distinguished by the brownish wash to the upper wing-coverts and some of the feathers of the back and upper tail-coverts, all of which are broadly margined with ashy-white, the tail feathers are brownish-grey, edged externally with brownish-white, and tipped with pale fulvous, and the darker cross-bars are less distinct; chin and centre of the throat whitish, with indistinct blackish shaft-lines; on the remainder of the under parts the feathers are pale bluish-grey with narrow black shaft lines, with which are intermingled many white feathers, especially on the lower breast, flanks and thighs, which in addition to the blackish shaft-lines have a short narrow greyish-black central streak near the tip; the white axillaries similarly marked, but with two or more lengthened paler streaks, which are confluent on some of the feathers; under wing-coverts white, their shaft-lines black and having a narrow lanceolate streak of brownish-grey down the centre of the feathers, darker on the outer series. Wing measurement the same as adult, 11.5 inches.

Mr. E. H. Lane has taken eggs in the Dubbo District, New South Wales, in September, and Dr. W. Macgillivray and Mr. W. McLennan have taken them in the same month, as well as the former finding young, in South-western New South Wales. Mr. C. Ernest Cowle has also taken them in September at Illamurta, in Central Australia. There is no record of the date of Mr. J. B. White finding the specimens on the Upper Thompson River, Queensland.

Falco subniger.

BLACK FALCON.

Falco subniger, Gray, Ann. and Mag. Nat. Hist., Vol. XI., p. 371 (1843); Gould, Bds. Austr., fol. Vol. I., pl. 9 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 28 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 394 (1874); *id.*, Hand-l. Bds., Vol. I., p. 274 (1899).

ADULT MALE.—*General colour above and below dark brown, some of the feathers on the upper parts with paler margins; quills blackish-brown on their upper, greyish-brown on their under surface, with whitish bars on their inner webs, smaller and less distinct on the secondaries; tail-feathers dark brown, with a slight greyish shade on the margins of their outer webs; forehead and basal portion of the feathers of the throat dull white; the under tail-coverts, with broken bars in the form of oblong spots, of faint buffy-white on either web; the greater under wing-coverts greyish-brown and similarly spotted with white; bill blue at base, black at the tip; legs and feet yellowish-grey; iris dark brown* (Bennett). *Total length 19.5 inches, wing 14.7, tail 8.8, bill 1.1, tarsus 2.*

ADULT FEMALE.—*Similar in plumage to the male. Wing 15.5 inches.*

Distribution.—Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, North-western Australia.

THE Black Falcon is widely distributed over the greater portion of the Australian continent. In Queensland Dr. E. P. Ramsay records that Inspector R. Johnstone noticed it on the tablelands, inland, about forty miles from Cardwell, and on the Seaview Range, and received a specimen obtained by Mr. J. B. White in the Barcoo District. Mr. C. W. De Vis received it in a collection of birds made by the late Mr. Kendal Broadbent on the Bellenden-Ker Range, and the latter has also noted it on the Upper Fitzroy River and Springsure in Central Queensland, and at Chinchilla on the Warrego River, five hundred and twenty miles west of Brisbane. I have also received a specimen from Mr. H. G. Barnard, obtained in a mountain range in Central Queensland. In Western New South Wales, Sturt obtained it in rocky country on Evelyn Creek, midway between Milparinka and Tibooburra, the bird being "shot in some brushes behind the Depôt, where he had been spreading alarm amongst a flight of Parrakeets (*Euphema bourkii*)."[†] The stronghold, however, of this species is apparently the Mossgiel and Lachlan Districts, in the south-western portions of New South Wales, where the late Mr. K. H. Bennett obtained birds and eggs, and who has contributed a most interesting and exhaustive account of the habits of this bird to the "Proceedings of the Linnean Society of New South Wales." Mr. G. A. Kearland has noted this species at Bacchus Marsh, near Melbourne in Victoria; in the MacDonnell Ranges in Central Australia, from where he has received its eggs, taken by Mr. C. Ernest Cowle, and has also noted it breeding near Lake Way, in Western Australia and the vicinity of the Fitzroy River in North-western Australia.

Gray's specific name of *subniger* is fittingly applicable to this bird, but the recognised vernacular name of Black Falcon is not correct, and is rather misleading. I have adult specimens now before me from Queensland, New South Wales and South Australia, the quills alone of which are dark brown and the upper and under parts much paler, and there is not a black specimen among them; in fact there are none of them so dark in colour as an immature

^{*} Proc. Zool. Soc. (1875), p. 579 [†] Exped. Centr. Austr., Vol. II., App. p. 14 (1849)

specimen of the Brown Hawk (*Hieracidea orientalis*), obtained on the Tweed River, New South Wales. I have never handled or seen a specimen from the western portion of the continent. Individual variation is not uncommon, some adult specimens having the feathers of the throat dull white streaked with brown, in others extended on to the sides of the head, and in what are probably immature specimens on to the feathers on the forehead and nape. Again others exhibit more or less the remains of broken cross-bars of buff and narrow whitish edges to the tips of the tail feathers.

From interesting notes of the late Mr. K. H. Bennett, made in the Mossgiel and Lachlan River District, New South Wales, I have extracted the following information:— "The first thing that strikes an observer with regard to *Falco subniger* is its extraordinary swift flight, almost equalling that of *Cypselus*, and the next its powers of endurance on the wing. It is tolerably numerous at certain times, for here they are undoubtedly migratory, arriving about the beginning of September in company with *Turnix velox*, on which it preys, and departing about February. Quail and the young of birds frequenting the plains, such as *Anthus australis*, *Cinclorhamphus cruralis*, and *Ephthiamra aurifrons* constitute its chief prey, for great as are the Black Falcon's powers of flight, he has more than a match in the adults of any of the above-mentioned birds, for they dodge and turn so quickly that the Falcon has no chance with them. On one occasion a 'Ground Lark' (*Anthus australis*) defied the united efforts of no less than three Falcons, the 'Lark' simply avoiding by a quick turn each Falcon's strike, but finally it fell a victim, completely tired out. One peculiarity of this bird not shared by any others of the family that I am aware of, is its habit when watching for prey of frequently ascending to such a great height as to be invisible, which shows the wonderful power of vision possessed by this bird. Many and many a time when on the plains, miles from any timber, with a flock of sheep camped, I have carefully scanned the sky overhead and around to see if a Falcon was visible, but not a speck has met my gaze in any direction. On starting to drive the sheep, and almost immediately have they disturbed a Quail, a rushing sound would be heard overhead, and on looking up a dark object would be seen descending with fearful rapidity, and so compressed or gathered together, as to render any one unacquainted with the bird to say what the object was. When some thirty or forty feet from the ground the descent is arrested, and by a sudden movement and expansion of wings the Falcon assumes a horizontal attitude, and the chase commences, which as a rule results in speedy capture, and the Falcon, by a series of graceful curves, again mounts into the air, devouring its prey as it ascends, an occasional tuft of blood-stained feathers slowly wafted earthwards, the same operation being repeated when the next quail, or some young bird is flushed. Sometimes, however, the Falcon is balked by the quarry suddenly dropping into some sheltering salt-bush, but rarely more than a foot or eighteen inches high. When this is the case the Falcon quickly arrests its flight, and closing its wings, by a powerful movement shoots perpendicularly into the air for some distance, and then expanding its wings, hovers for a short time over the bush in which its prey has taken refuge. Should it be a scanty one, and the unfortunate bird visible, the Falcon slowly descends, alighting on the top of the bush, and flapping its outstretched wings drives the terrified victim out, when it is speedily clutched in the talons of its remorseless foe. Should the bush prove too dense, and the bird not to be seen, the Falcon gives it up and mounts skyward again. As an instance of the sluggishness or stupidity of the Letter-winged Kite, I may mention that I one day saw a Black Falcon dash into a number of them perched on a dry Pine-tree, close to the house, and clutch one in its sharp talons; both birds fell to the ground, and after struggling for a few moments the Falcon rose heavily and flew off with its prey; the other Kites sat perfectly still all through the performance. This went on for several days, the Falcon each time securing a victim. Noticing that the Falcon's visits occurred at about the same hour daily, I determined to try

and capture both the Falcon and its prey. With this object I secreted myself in some thick bushes close to the foot of the tree in which the Kites sat. I had not long to wait, for soon Falcon and Kite came struggling down within a few feet of where I was concealed, and I sprang out and caught one of the previously outstretched wings of the Falcon. So fierce was its clutch that I had difficulty in releasing the Kite, which, though severely wounded, had sufficient strength to make off. I cut the Falcon's wings and kept it in confinement for some time, but it was so fierce and intractable that I got disgusted and ended its career. I fancy these cases of one bird of prey attacking another with the intention of feasting on it are very rare; in all my wanderings I never saw but one other instance of the kind, and in that case the aggressor was a Black-cheeked Falcon (*Falco melanogenys*), and the bird attacked a Delicate Owl (*Strix delicatula*); the latter, however, after a short tussle, managed to free itself. A friend of mine, who is a keen observer, told me that he was driving a small lot of sheep, and a Black Falcon had made several ineffectual efforts to capture a 'Ground Lark' (*Anthus australis*), and whilst in pursuit of it some distance ahead of the sheep, they disturbed a Black Duck (*Anas superciliosa*) from her nest under a Cotton-bush, and she flew off in the direction the Falcon had gone; the latter caught sight of her, and leaving the 'Lark' turned and made for the Duck, and so great was the concussion when they met that they fell to the ground, and my friend on riding up found both dead. A large flat-winged dipterous parasite infests the Black Falcon; it moves about sideways under the feathers with extraordinary rapidity.

"The Black Falcon sometimes breeds here, but not often, for during my long residence (over twenty years) in this locality, I have only met with their nests on four occasions (one only a few days since). The nest I recently found was clearly a case of appropriation, as last year (1883) it was occupied by a pair of *Gypoictinia melanosternon*; the Falcons had possession, and the nest contained four eggs. Immediately beneath the edge of the nest a pair of *Nerophila leucopsis* had constructed their nest, which contained young, and the old birds were flying in and out apparently quite unconcerned at the proximity of their dangerous neighbours, well knowing that the interstices between the large sticks of which the upper nest was composed afforded them a secure asylum."

The following notes were made later by Mr. Bennett, when living at Yandembah Station, in the Lachlan District, New South Wales:—"On the 3rd June, 1889, while out on the run, my dog killed a rabbit, and on returning past the spot I was surprised to see a Black Falcon (*Falco subniger*) feeding on the carcass. This is most unusual, for hitherto I have never known this bird, or in fact any of the true Falcons, to feed upon anything they had not killed. It is the first example I have seen of the Black Falcon for two years. On the 31st December, 1889, whilst driving a lot of sheep, a pair of Black Falcons accompanied me for a considerable distance, attracted by the grasshoppers disturbed by the sheep. These insects they dexterously caught, and devoured while on the wing, as did also a *Milvus affinis*, which was attracted by them. The absence of Quail and other small birds is doubtless the cause of these species preying on insects."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray writes:—" *Falco subniger* is a rare bird here, only one pair having been seen; these we disturbed from their roosting place in a Gum on Yalcowinna Creek, on the morning of 12th September, 1909, when they seemed to glide away through the trees. On the wing the Black Falcon is a magnificent looking bird, its dark plumage, with white markings about the face, and quick gliding flight, easily distinguishing it from all other birds. On our return journey this creek was revisited on the 8th October, and keeping a look out for these birds we flushed the female from an old Wedge-tailed Eagle's nest, placed in a Gum growing in the bed of the creek. The nest was only twenty feet from the ground, and contained only one egg of the Falcon, which we decided to leave in hopes of getting a full clutch, after giving it a good shaking up to stop the

process of incubation. The bird, on leaving the nest, flew quickly away, and did not appear again. Mr. McLennan and I revisited the nest early next morning, the female again being flushed from the nest and the male from an adjacent tree. As before they flew away, making no attempt to defend their home, and did not again put in an appearance. Mr. McLennan paid a flying visit to the nest nearly a fortnight later, when he found the bird still sitting on the one egg."

From Melbourne, Victoria, Mr. G. A. Keartland sends me the following notes:—"My first specimen of the Black Falcon (*Falco subniger*) was shot many years ago at Heidelberg. It is occasionally seen near Melbourne and at Bacchus Marsh. In Central Australia these birds frequent the rocky gorges of the MacDonnell Range, where they prey upon the small marsupials and reptiles so common in the spinifex. They are very wild and swift in their movements. Their nests are similar to those of *Hieracidea berigora*. In July, 1896, during the journey of the Calvert Expedition, I saw a nest of this species in a Cork-bark tree, near Lake Way, Western Australia, containing a young bird, and in January, 1897, several others were noted in the tall *Eucalypti* near the Fitzroy River, North-western Australia."

A set of three eggs in the Australian Museum Collection, taken by the late Mr. K. H. Bennett at Mossgiel, on the 27th September, 1884, are oval in form, the shell being fairly smooth, close-grained and almost lustreless. Two of them are of a faint reddish-buff ground colour, almost obscured by numerous uniformly distributed freckles and spots of a richer shade of the ground colour, with here and there others of a still darker hue; the other has the yellowish-buff ground colour thickly freckled all over with faint reddish-brown, the markings being larger and darker on the smaller end, where they are confluent, forming there an irregular zone; also a small indistinct cap; there are a few small darker blotches on the larger end. These eggs more closely resemble in colour those of *Falco hypoleucus*, and are not rounded in form or so rich in colour as typical eggs of *F. melanogenys*. They measure as follows:—Length (A) 2.13 × 1.62 inches; (B) 2.14 × 1.61 inches, this egg is figured on Plate B. XVI., fig. 2; (C) 2.2 × 1.57 inches.

Falco lunulatus.

WHITE-FRONTED FALCON.

Falco lunulatus, Lath., Ind. Orn., Suppl. II., p. xiii. (1801); Gould, Handbk. Bds. Austr., Vol. I., p. 29 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 398 (1874); *id.*, Hand-l. Bds., Vol. I., p. 275 (1899).

Falco frontatus, Gould, Bds. Austr., fol. Vol. I., pl. 10 (1818).

ADULT MALE.—*General colour above dark slaty-blue with blackish shaft lines, being slightly paler on the rump and upper tail-coverts; scapulars and upper wing-coverts like the back, the median series of the latter with blackish centres; the lesser coverts greyish-black; primaries dark brown, slightly washed with grey, their inner webs with rufous bars in the centre; secondaries like the back, and similarly barred with rufous on their inner webs, and margined around their tips with greyish-white, except the innermost ones; tail-feathers bluish-grey, crossed with blackish-brown bands, their tips whitish, washed with rufous more strongly near the shafts, the inner webs of all but the central pair barred with rufous, and which extends on to the outer webs of the penultimate feather; crown of the head and nape blackish-brown washed with bluish-grey, the bases of the nape feathers more or less rufous; lores whitish; sides of the head and ear-coverts brownish-black; throat and sides of the neck white, the former slightly and the latter strongly washed with rufous; remainder of the under surface pale rufous, with narrow blackish shaft streaks on the fore-neck, and widening out into dark bluish-grey sagittate markings on the lower breast, where many of the feathers of the breast have a rust-coloured*

wash; thighs rufous, with the remains here and there of blackish shaft streaks; bill bluish-lead colour, black at the tip; legs and feet yellow; iris dark brown. Total length in the flesh 12 inches, wing 9.7, tail 5.8, bill 0.65, tarsus 1.4.

ADULT FEMALE.—Similar in plumage to the male, but larger. Wing 10.5 inches.

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Tasmania.

THE White-fronted Falcon is the smallest of the genus *Falco* inhabiting the Australian Continent, over which it is generally distributed, and is likewise found in Tasmania. In the Australian Museum Collection there are specimens obtained at Cape York in North-eastern Queensland, at King George's Sound in South-western Australia, at Port Essington in the Northern Territory of South Australia, at Port Lincoln in South Australia, and various localities in New South Wales. It has been recorded also in nearly every collection of any size made in Australia, and which it is needless here to enumerate.

Latham originally described it as *Falco lunulatus* in his "Index Ornithologicus," which is founded on the Lunated Falcon of his "General Synopsis of Birds," and according to the late Dr. R. B. Sharpe in his "History of the Collections of the British Museum," the latter is taken from a picture of Watling's now in the British Museum, as were many others of Latham's Australian descriptions.

This species chiefly frequents open forest and heath lands, belts of timber on the plains, and rocky mountain ranges. It is generally distributed over the County of Cumberland, but it is by no means common. In the neighbourhood of Sydney it is obtained sometimes at Randwick, Ashfield and Middle Harbour, and I have seen it occasionally flying over the Sydney Domain, but not of recent years. The specimens received in the flesh by the Trustees of the Australian Museum, are generally the result of a Falcon falling a victim to a poultry keeper's gun while it is engaged in some pigeon or chicken-pilfering expedition. With a specimen sent from Picton, Forester H. O. Rotton writes:—"I forward a 'Hawk' which I shot here to-day, it having done a great deal of harm among the chickens and pigeons on several of the farms in this district."

Comparative with its size it is one of the most courageous of all our Australian birds of prey, fully equalling that of the Collared Sparrow-Hawk, a bird about its own size. It does not hesitate to attack almost anything that flies, from the size of a Finch to a Cockatoo, and even larger. Where procurable, Pigeons of all species form a favourite article of diet, and when the Falcon makes its swoop at one of these birds while on the wing, the Pigeon is comparatively stationary, to the swift and arrow-like flight of its adversary. It does not, however, always succeed in securing its would be victim. In company with Mr. E. H. Lane and Mr. George Savidge, at Middle Harbour one day, I saw a White-fronted Falcon during flight strike a Magpie Lark, the latter uttering shrill notes of distress as the two birds were tumbling about in the air, but as we hastened to the spot the Magpie Lark eventually eluded the grasp of the Falcon. On the Namoi River I saw this species engaged in the pursuit of Welcome Swallows, but did not see it secure one.

With a species having so wide a geographical range there is the usual amount of individual variation found in the plumage of the adults of both sexes, especially in specimens from widely separated localities, although occasionally in examples from the same district. Some adult birds in breeding plumage have the upper parts brownish-black with the edges of the feathers indistinctly margined with bluish-grey, and the throat and sides of the neck pale creamy-white; in others the latter part is rufous-buff. An adult female from Port Essington, in the Northern Territory of South Australia, has the foreneck pale rufous-buff broadly streaked with dark brown. Wing 10.65 inches. In some specimens the forehead is whitish, in others it is faintly tinged with buff. Usually young birds are darker above, and richer in colour below, but there

is an immature female obtained at Lithgow, in the Blue Mountains, New South Wales, which has most of the feathers on the upper parts pale brown, with which are intermingled some slaty-blue feathers of the adult stage; the throat and sides of the neck white, the latter washed with buff; remainder of the under surface pale creamy-buff, the feathers on the foreneck with a narrow sagittate dark brown marking down the centre, and some of the feathers on the sides of the breast mottled with rusty-rufous; thighs pale creamy-buff passing into almost pure white on the lower feathers. The wing-measurement exceeds that of any other specimen in the Australian Museum Collection, 10·8 inches. An immature male from King George's Sound, Western Australia, has the rufous margins to the feathers of the upper parts much darker, and most of the feathers on the crown of the head are dull rufous with indistinct blackish shaft streaks, and the feathers on the lower breast are entirely rusty-rufous with only slight indications here and there of blackish shaft streaks. Wing 9·5 inches.

To show the audacity of this species, Mr. W. Butcher, bird-dealer of Sydney, showed me a rough skin of one he had caught in August, 1909, in the nets, whither it had followed a number of Orange-billed Grass Finches (*Porphyila heeki*), at a place seventy miles south of Pine Creek, in the Northern Territory of South Australia, and about three hundred miles inland from Port Darwin.

The following information has been extracted from notes received from Mr. H. G. Barnard, of Bimbi, Duaringa, Queensland:—"In 1907 I took a set of three eggs of *Falco lunulatus* from a nest eighty-five feet from the ground. This nest was built by a pair of Crows (*Corvus coronoides*), and when just completed a pair of White-fronted Falcons tackled the Crows, and after four days succeeded in driving them off. It was close to the house, and I had a good chance of watching them. After hunting the Crows away the Falcons remained about the nest, but it was not till six weeks after that they made use of it, and I succeeded in obtaining a nice clutch of three eggs; the birds were very pugnacious while I was robbing the nest, and several times almost knocked my hat off; the lining of the nest was composed entirely of soft bark and horsehair. A set of eggs taken on the 3rd October, 1908, was also laid in a Crow's nest from which the birds had been driven away, the lining of the nest being composed entirely of soft bark. The outside measurement was thirteen inches by nine inches, and the depth of the egg cavity six inches by seven inches across, the height from the ground being ninety feet. At thirty feet from the ground a large horizontal limb protruded from the main stem; on the underside of this limb, and about ten feet from the main stem, was a large (what we call paper-bark) hornet's nest; these nests are built to a large size; I have frequently seen them three feet long by twelve inches deep, and thick in proportion. As I neared the limb, cutting my steps, the hornets got very savage, and I thought I was in for a bad time; the hornets swarmed on the nest in thousands, and several times flew at me, but when they did I remained perfectly still, and they returned to their nest; at last I had passed the limb, and got above them, when I could breathe freely again, then up and up, till within a few feet of the Falcon's nest, when suddenly the bird dashed off straight at me, and only for ducking my head I believe would have knocked my hat off. I was rewarded for my climb with a set of three lovely fresh eggs. When these Falcons build their own nests the lining is composed of leaves.

"The food of this Falcon consists largely of small birds; they also eat dragon-flies, which I have seen them catch while on the wing. I have also seen them of an evening, after rain, catching the large winged ants as they flew; the ants were caught in the birds claws, and transferred to the mouth while the bird was on the wing."

While resident at Mossgiel, New South Wales, the late Mr. K. H. Bennett wrote:—" *Falco lunulatus* is frequently met with in this locality, although it is by no means plentiful. Its prey consists chiefly of small birds, such as Quail, etc., to which is added some of the larger insects,

like the mantis and grasshopper. In habit it is bold in the extreme. One morning whilst at breakfast I observed one of these birds fly several times past the verandah, and now and again make a dash at some creepers with which it was covered. On going out I found a young Swallow, just able to fly, had either fallen out, or left a nest of these birds under the verandah, and had fluttered into the creepers, and this attracted the Falcon. I caught the young Swallow with the intention of placing it in the nest, and whilst doing so held it by the legs, which caused it to flutter, when without any hesitation the Falcon darted into the verandah and struck the Swallow in my hand, one claw penetrating my thumb and clutched the young bird. Incredible as it may appear, the Falcon commenced eating the Swallow whilst perched on my hand, although my mother and two of my sisters were standing alongside of me. With my free hand I caught the Falcon by the legs, and a piece of string being obtained tied it to the verandah post, where after a few fruitless attempts to escape, he eventually gave it up as hopeless, and assumed a defiant attitude. On throwing the body of the dead Swallow to him he at once clutched and devoured it, as he did with a *Myzantha flavigula* I shot and threw to him. On several occasions I have found their nests, which are almost always placed in an inaccessible situation. A nest I found in the month of October was placed in one of the highest trees in the neighbourhood, and was a rather bulky open structure, composed of sticks compactly formed together, the inside being deep and lined with decayed fine-bark fibre, and contained four eggs, which in general and ground colour much resembled those of *Falco subniger*." Later at Yandembah Station, in the Lachlan District, Mr. Bennett records finding a nest with three eggs on the 23rd September, 1889."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray writes:— "*Falco lunulatus* is dispersed throughout the district. It preys upon many kinds of bird life, Pigeons (*Ocyphaps lophotes*), Miners (*Myzantha flavigula*), Parrakeets (*Barnardus barnardi* and *Mclopsittacus undulatus*), the latter especially in the Spring, when the Falcon is nesting, seems a favourite food. These birds also get a lot of Brown Song Larks (*Cincloramphus cruralis*), and will follow a flock of sheep travelling through the saltbush to take advantage of any birds forced in this way to break cover. On our trip during September, 1909, we came across a nest of this species on Caloola Creek, just below Stone Hut. It was placed at the very top of a tall Gum-tree: the branch, however, though small, was an upright one, and not nearly so risky a climb as the Grey Falcon's. It was found to be ready for eggs. This was on the 16th September. We again visited the nest on the 22nd. When Mr. W. McLennan started to climb the tree the male bird appeared on the scene, and became very much concerned, darting down past him, flying up above the tree, and swooping down again with half closed wings through the tree, almost touching Mr. McLennan on several occasions, wheeling up into the air, turning gracefully, and down again, uttering a shrill twittering cry each time on this downward course. Whilst this was going on the female flew anxiously round and round above the tree. The nest was loosely constructed of sticks, the egg cavity lined with fine bark, but not so deep as the one at Fowler's Gap. It only contained one egg. The male continued his attacks until Mr. McLennan had come almost three parts of the way down the tree. On the 18th, as we approached the crossing of Fowler's Gap Creek, a male Little Falcon flew by making an inspection of our party, turned and flew up the creek, leading us to suspect a nest in the vicinity. Mr. McLennan, on going a short way down the creek, found the nest on the topmost bough of the tallest tree on the creek; by actual measurement it proved to be ninety feet from the ground. The climb was an exceedingly risky one, the rope being used to brace the frail limb and secure the climber. The two birds kept hovering uneasily round, the male making a few dives towards the climber, but not so persistently nor so boldly as the male at Stone Hut. The same shrill twittering cry was uttered by the male bird. The nest was loosely constructed of sticks lined with fine soft bark, the outside diameter being eighteen inches by a depth of one foot, the egg cavity six inches in diameter by five inches in depth. It contained three fresh eggs.

“During my trip in September, 1911, two pairs of Little Falcons (*Falco lunulatus*) came under my notice; one pair had a nest near that of *Gyphoctinia melanosternon*, on Sleepswell Creek. This nest, found on the 25th September, was high up in a creek Gum, the female was on the nest and the male sitting on a branch immediately under it; the female had not, however, laid. The second pair I found nesting on the following day, high up in a Gum on the exposed side of Yalcowinna Creek. The female was sitting on three fresh eggs, and the male was in another part of the same tree; this bird was not as aggressive as the one we came across on Caloola Creek in 1909.”

Mr. G. A. Kearland writes me as follows from Melbourne, Victoria:—“The White-fronted Falcon (*Falco lunulatus*) is found everywhere, either on the coast or far inland. I shot a pair at Brighton whilst they were endeavouring to capture some Pigeons. This Falcon possesses extremely keen sight, and singles out its prey at a great distance. It then flies fast and low until within striking distance, when it seldom fails to secure its victim. In Central Australia I saw one dash into a flock of Finches drinking at a rock pool, and before the little birds could scatter sufficiently to escape, it seized one in each foot, and then flew away with them. At Brookman Creek, Western Australia, a flock of Cockatoo-Parrakeets were drinking on the water's edge, when a White-fronted Falcon suddenly dashed into their midst. The Cockatoo-Parrakeets scattered in all directions, but the Falcon pursued and caught one which flew towards me, and was making off with it when I fired, knocking some feathers out of the Falcon. It dropped the Cockatoo-Parrakeet to the ground, but in a few seconds it swooped down on its victim, and was carrying it away, when another shot caused it to again drop the bird, which was quite dead when picked up. The White-fronted Falcon is more courageous and stronger on the wing in proportion to its size than any other representative of the Falconinæ. It always chooses living prey, and will seize and carry off birds exceeding itself in weight, and can overtake and capture the fastest flying Parrakeets. During the breeding season they frequently make raids on domestic Pigeons kept in the centre of our city, and carry off the strongest homing Antwerps.”

The eggs are usually three in number for a sitting, varying from oval to elongate-oval in form, the shell being comparatively close-grained, dull and lustreless, one egg only in nine specimens before me having a slight gloss. They are variable in colour, as is common with the ACCIPITRES, even in the same set. Of a set of three taken by the late Mr. K. H. Bennett at Yandebah Station, in the Lachlan District, New South Wales, on the 23rd September, 1889, one specimen has the ground colour pale pinkish-red, which is thickly freckled and spotted, and sparingly blotched with darker shades of the ground colour, the blotches being chiefly confined to the smaller end; the other two specimens are of a buffy-white ground colour, freckled, spotted and blotched with rufous-brown, the ground colour of one specimen being slightly lighter and the markings distinctly larger. The latter egg is figured on Plate B. XVI., fig. 8, and they measure as follows:—Length (A) 1·75 × 1·34 inches; (B) 1·79 × 1·34 inches; (C) 1·76 × 1·3 inches. A set of three taken by Mr. H. G. Barnard, at Coomooboolaroo, Duaringa, Queensland, on the 8th October, 1892, are of a yellowish-buff ground colour, which is thickly mottled, spotted and blotched with darker shades of the ground colour, some of the blotches also having a faint reddish hue; on one specimen the blotches are confined chiefly to the smaller end, on the others to the larger, forming a cap of confluent markings on one of them: the latter egg is figured on Plate B. XVI., fig. 7, and they measure as follows:—Length (A) 1·72 × 1·3 inches; (B) 1·82 × 1·3 inches; (C) 1·89 × 1·27 inches. Another set of three in Mr. Malcolm Harrison's collection, taken by Mr. H. G. Barnard at Bimbi, Duaringa, Queensland, on the 2nd October, 1908, measures:—Length (A) 1·73 × 1·33 inches; (B) 1·74 × 1·33 inches; (C) 1·75 × 1·32 inches. From Mr. Barnard I also received two sets of three taken by him respectively at Coomooboolaroo, Duaringa, on the 18th September and the 22nd October, 1893.

Young birds are dark brown above with pale rufous margins to the upper wing-coverts, scapulars and feathers of the back, and slightly broader and darker on the upper tail-coverts; tail feathers dark brown and barred on both webs with rufous, less distinct on the central pair, which are slightly washed with grey; crown of the head dark brown with indistinct pale rufous margins to most of the feathers; bases of some of the feathers on the nape rufous; forehead buffy-white; lores, sides of the head and ear-coverts black; throat whitish with very narrow blackish shaft stripes; sides of neck and fore-neck pale creamy-buff, the latter broadly shaded with dark brown down the centre of each feather; sides of the breast dark rust-rufous, with indistinct blackish-grey narrow shaft streaks, and the remains of similarly coloured cross-bars on the lower sides; the centre of the abdomen and under tail-coverts very much paler, and similarly streaked with blackish-grey. Wing of a young male obtained at Randwick, near Sydney, 8.1 inches. There is as much individual variation in the plumage of the young of this species as there is in the adult.

In Eastern Australia September and the three following months constitute the usual breeding season of this species.

Genus **HIERACIDEA**, *Gould*.

Hieracidea berigora.

WHITE-BREASTED HAWK.

Falco berigora, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 184 (1827).

Hieracidea occidentalis, Gould, Bds. Austr., fol. Vol. I., pl. 12 (1848).

Hieracidea occidentalis, Gould, Handbk. Bds. Austr., Vol. I., p. 33 (1865).

Hieracidea berigora, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 421 (1874); *id.*, Hand-l. Bds., Vol. I., p. 276 (1899).

ADULT MALE.—*General colour above pale rufous or sandy-brown, the centres of some of the feathers of the back of a more decided shade of brown, and those of the rump more distinctly margined with rufous, and all having narrow blackish shaft lines; scapulars and upper wing-coverts like the back, but with more pronounced darker centres, the greater series spotted with rufous; quills dark brown, spotted with rufous on their outer webs, except the outer primaries, and slightly washed with grey, their inner webs notched or toothed up to the shafts with rufous, the greater part of the under surface of the quills, with the exception of a few faint barrings, pure silky-white, the secondaries margined around the tips with pale fulvous-white; tail-feathers greyish-brown, banded with rufous and tipped with white, except the central pair, these white tips being broader on the outermost feather on either side; crown of the head like the back, the forehead slightly paler, those at the extreme base of upper mandible dull whitish, all the feathers having distinct narrow black shaft-lines; bases of most of the feathers on the nape white, forming there an indistinct band; feathers around the eye blackish; chin and throat faint buffy-white, with narrow blackish shaft-lines, the sides of the face and base of the ear-coverts a slightly purer white, with a moustachial brown streak down the cheeks; apical portion of the ear-coverts brown; remainder of the under surface and under tail-coverts white with narrow blackish shaft lines to the feathers, those on the foreneck and upper breast and under tail-coverts with a faint creamy-buff wash, and passing into a pale rufous or sandy-brown on the sides of the body; thighs rufous-brown, the basal portion of some of the feathers spotted with light rufous; "bill horn-blue; legs and feet lead colour; iris, dark brown" (Bennett). Total length in the flesh 16 inches, wing 13, tail 7.8, bill 1, tarsus 2.6.*

ADULT FEMALE.—*Similar in plumage to the male, but slightly larger. Wing 14 inches.*

North-western Australia, Northern Territory of South Australia, Queensland, South Australia, Central Australia, Western Australia.

WHERE there are one or two species of "Brown" Hawk inhabiting Australia has been puzzled Ornithologists. Gould held the opinion that there were two species, one inhabiting the eastern, the other the western portion of the continent, inosculating in South Australia. Certainly specimens may be found agreeing very well with the two birds represented in the "Illustrations of the Birds of Australia" under the names of *Hieracidea berigora* and *H. occidentalis*. In the "Catalogue of Birds in the British Museum," the late Dr. R. B. Sharpe shares Gould's opinion. In describing *Hieracidea berigora* remarks:—"The possession by the Museum of the specimens of *Hieracidea berigora*, which were received from the Linnean Society, enables me to state that *Hieracidea occidentalis* of Gould is the true *H. berigora*. Both these species are indistinguishable from the other, in their adult and in their young plumages." Messrs. Vigors and Horsfield, in describing *Falco berigora* in the "Transactions of the Linnean Society of London" remark:—"The native name of this bird, which we have adopted as its specific name, is 'Berigora.' It is called by the settlers 'Orange-speckled Hawk.' Mr. Caley informs me that the orange marks in the plumage of this species are considerably stronger in recent specimens than in those of the Society's collection, which are much faded. The specific characters of this bird accord very closely with those of Dr. Latham's 'Cream-bellied Falcon,' which that bird is described as having a double tooth to its bill, while ours are singly-toothed as in the true genuine Falcons." Caley lived at Parramatta, fifteen miles from Sydney, during the early days of settlement of New South Wales, and his specimens were doubtless, as was the greater part of his birds, collected in the neighbourhood. Dr. Sharpe proving that Gould's *H. occidentalis* is the true *H. berigora*, does away with the latter's idea that one was representative of the other on opposite sides of the continent. In the "Report of the Expedition to Bellenden-Ker Range," North-eastern Queensland, Mr. C. W. De Vis, M.A., remarks as follows under "Birds of which specimens were obtained":—" *Hieracidea berigora*, Vigors and Horsfield, the Brown Hawk: I find no constant difference of colouring, and no real distinction of locality between this and the so-called Eastern Brown Hawk, *H. orientalis*, Schlegel. Birds with the colouring of each and intermediate grades thereof, occur all over Queensland, and during the expedition were seen in company on the Mulgrave Plains; the name *H. orientalis*, applied to our Queensland bird, should therefore be allowed to lapse." With a series of over thirty specimens from different parts of the continent and Tasmania, it would have much simplified my labours to have picked out examples agreeing with both of those described and figured forms, and referred to them as distinct species, but one cannot shut ones eyes to the fact that intermediate forms occur containing the characters of both, and that light and dark forms occur in the same locality, and may be met with together. There is, however, a greater preponderance of adult birds with the dark brown upper parts with the feathers more or less margined with rufous, and the under parts brown, with the throat, fore-neck and centre of the breast more or less pale creamy-buff, and in some mottled with brown or rufous and brown, and certainly in these stages of plumage they have been found breeding. Specimens from King George's Sound, Western Australia and Derby, North-western Australia, are rufous-brown above with distinct blackish shaft lines, with the under surface white washed with rufous, which is more distinct on the sides of the body; thighs rufous, and are smaller than eastern birds. Wing of adult male specimen from King George's Sound 11 inches; of adult male from Derby 12.5 inches. Much paler rufous-brown with paler thighs and almost entire white under surface, with narrow dark brown shaft lines to the feathers, is an adult female shot at the nest by the late Mr. K. H. Bennett, and labelled "*Hieracidea occidentalis*, Yandembah Station, Lachlan District, New South Wales. Sex female." This specimen has the whole of the throat, breast and abdomen almost pure white, and another

* Cat Bds. Brit. Mus., Vol. I., p. 421 (1875). † Trans. Linn. Soc., Vol. XV., 185 (1826). ‡ P. 84 (1888).

procured in the same locality is an adult female slightly richer rufous on the upper parts. These birds from King George's Sound, Western Australia, and from Yandembah Station, New South Wales, I look upon as the true *Hieracidea berigora* of Vigors and Horsfield. Of intermediate forms there are two adult males, one obtained at Fairfield, eighteen miles south of Sydney, and another procured by Mr. W. W. Thorpe at Randwick, a suburb of the metropolis. A more rufous form on the upper parts, but with the under surface like *H. orientalis*, is a male procured by the late Mr. K. Broadbent, near Launceston, Tasmania. Of course it does not follow that finding rufous and brown birds in company signify they are one and the same species, for how frequently are *Elanus axillaris* and *E. scriptus* found together, but one cannot get away from the fact that intermediate forms occur, and they are certainly not the immature or young stage of *Hieracidea orientalis*. We have in the Australian Museum Collection specimens of the latter, from the nestling to the adult, but not the young stage of *H. berigora*. I, therefore, intend at present to keep the two separate, although I may not be correct in doing so. Look at the difference between a light and dark specimen of *Nisactus morphnoides*; on the other hand I have never seen a typical *Hieracidea berigora*, that is sandy-brown above and almost pure white below, that was obtained in Tasmania.

As the type of *Hieracidea berigora* was obtained by Caley in New South Wales, I have taken the foregoing descriptions from specimens obtained in that State. Examples, however, from King George's Sound, Western Australia, have the thighs a decided rufous, and are of a darker rufous on the upper parts, and also smaller. Wing of adult male 11 inches; of adult female 12.7 inches.

There is nothing to distinguish between the two forms in habits, food and nidification, when they construct a nest at all, for more frequently they reline with a few green leaves the deserted tenement of another species, often that of a bird of prey, and also the disused nests of the Crow (*Corvus coronoides*) and the Raven (*Corone australis*). As the two forms are often found together, and are widely distributed over Australia, it is impossible to tell to which eggs belong unless one carefully notes the parents, or shoots them at the nest. The late Mr. K. H. Bennett, a keen observer, and a field naturalist of long and varied experience, recognised two species of *Hieracidea*, and as he procured the birds when taking the eggs of *H. berigora*, I have described only the specimens taken by him.

Dr. W. Macgillivray writes me as follows from Broken Hill, in South-western New South Wales:—"The lighter Brown Hawk (*Hieracidea berigora*) appears to shade into the other species, *H. orientalis*. Several nests have been found, but are indistinguishable from those of the common bird. It occurs, I should think, in about the proportion of one to two hundred of the other, and its habits and general economy are the same."

Dr. A. M. Morgan, who accompanied Dr. A. Chenery during a trip made from Port Augusta to the Gawler Ranges, South Australia, in August, 1900, writes:—"Both the light and dark forms of Brown Hawk were very plentiful, and often seen in company. Several nests were seen in course of construction, but none with eggs. On the 9th August a Dingo was disturbed while feeding upon one of these birds. As the carcass was quite fresh, and in the middle of an uninhabited salt-bush plain, the bird had probably been caught by the dog."

Probably referable to this form are the following notes of Mr. Chas. G. Gibson, late Assistant Government Geologist of Western Australia:—"At Lawler's, in the East Murchison District, Western Australia, I took a nest of the Brown Hawk, with three fresh eggs, on the 19th September, 1906, and on the 16th October following found a nest at Darlôt with three eggs just upon the point of hatching. The latter nest consisted of a few green leaves placed on the debris in a basin-shaped depression measuring eighteen inches in diameter by nine inches in depth, in the top of a trunk of a broken hollow White Gum, and surrounded with a thick bunch

of twigs." While in the party engaged on the survey of the proposed Trans-continental Railway Line, between Western Australia and South Australia, Mr. Gibson forwarded me a photograph of a nest of *Uroæetus audax*, built in a very low tree on Nullabor Plains, and writes:—"The nest of *Aquila audax*, built in a dead Mulga, and found on the 1st of October, 1908, was tenanted by a pair of Brown Hawks and their three small young; a second and somewhat similar nest of *A. audax* was found during the previous month, taken possession of also by a pair of Brown Hawks and three young ones."

The eggs are three in number for a sitting, rounded oval in form, the shell being comparatively close-grained, dull and lustreless, the ground colour varying from a pale yellowish-buff to a reddish-white, which is usually almost obscured with numerous small freckles and spots of rich reddish-buff thickly and uniformly distributed over the shell; others have large irregular-shaped pale chestnut-brown blotches intermingled with the freckles and dots sometimes predominating at the larger end, but more often evenly distributed over the surface. Occasionally specimens are found as if the markings had been rubbed off when wet, leaving a blurred appearance, and two types of eggs often occur in the same set. A set of two taken on the 18th October, 1890, by the late Mr. K. H. Bennett, at Yandembah Station, in the Lachlan District, New South Wales, measures:—Length (A) 1·87 × 1·6 inches; (B) 1·95 × 1·6 inches; (C) 1·91 × 1·58 inches. Another set taken in the same locality on the 28th October, 1890, measures:—Length (A) 1·97 × 1·59 inches; (B) 1·95 × 1·58 inches; (C) 1·96 × 1·58 inches. The latter egg is represented on Plate B XVI., fig. 6.

In New South Wales July and the five following months constitutes the usual breeding season, the late Mr. K. H. Bennett having taken fresh eggs at the latter end of August until the end of October.

Mieracidea orientalis.

BROWN HAWK.

Mieracidea berigora (*nec* Vig. and Horsf.), Gray, Gen. Bds., Vol. I., p. 20 (1845); Gould, Handbk. Bds. Austr., Vol. I., p. 31 (1865).

Mieracidea berigora (*nec* Vig. and Horsf.), Gould, Bds. Austr., fol. Vol. I., pl. 11 (1848).

Falco berigora orientalis, Schlegel, Naum., 1855, p. 254.

Mieracidea orientalis, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 422 (1874): *id.*, Hand-l. Bds., Vol. I., p. 276 (1899).

ADULT MALE.—*General colour above brown with narrow indistinct margins around the tips of most of the feathers: those on the rump and upper tail-coverts having darker and broader rufous margins, and the longer coverts also crossed with broken rufous bars: upper wing-coverts like the back, but with paler margins, some of the median and greater series with concealed broken rufous cross-bars: quills dark brown, their outer webs with a greyish wash, and sparingly spotted with rufous near the shaft, except the outer primaries, their inner webs broadly notched or toothed with rufous, the tips of the outer secondaries having narrow whitish margins: head and hind-neck brown with blackish shaft stripes, in some showing more or less the fawn centres and the white bases to the feathers of the nape; extreme base of the forehead whitish: loreal bristles and a narrow line of feathers surrounding the bare skin around the eye, black: ear-coverts brown with creamy-white bases: centre of the throat and bases of the feathers on the sides of the neck creamy-white, and separated by a brownish-black moustachial stripe: remainder of the under surface dark brown, mottled with creamy-white on the centre of the body; under tail-coverts brown, transversely barred with creamy-white: thighs dark brown, with*

concealed rufous spots; bill lead colour, darker at the tip of upper mandible, legs and feet slaty-white; iris dark brown. Total length in the flesh 17 inches, wing 13.5, tail 8, bill 1, tarsus 2.5.

ADULT FEMALE.—*Similar in plumage to the male, but larger. Wing 15 inches.*

Distribution.—North western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Tasmania.

THE Brown Hawk is generally distributed in favourable situations over the continent of Australia, and is likewise found in Tasmania. It is probably the commonest species of the Order ACCIPITRIS inhabiting this part of the world. It chiefly frequents forest and heath lands, and wide open expanses clothed with herbage, situations at all times likely to afford it an abundant food supply. Near Sydney it is more often met with on the waste lands about Botany and La Perouse, Long Bay, and south of Randwick, slowly flying over and examining the cover beneath, occasionally stopping now and again, and hovering for some seconds, before dropping into concealment, attracted by some reptile or other prospect of obtaining a meal.

Of the numerous specimens forwarded to the Trustees of the Australian Museum, from widely separated parts of New South Wales, it is worthy of note that during a period of twenty-five years not one has been received on account of its chicken or fowl destroying proclivities, and which more often is the cause of various species of ACCIPITRES being sent to the Institution. Stomachs of specimens examined, procured in the neighbourhood of Sydney, usually contain lizards as the staple article of their diet, occasionally the remains of frogs and some of the larger kinds of insects, and rarely small birds. Many writers have recorded the attractions a bush fire has for certain birds of prey, but in none is it better exemplified than in the present species. Gould, too, has pointed out how useful a bird it is in destroying, when it assembles in flocks, the countless myriads of caterpillars and insect pests, gorging themselves with this kind of food until they are too lethargic to fly when an attempt is made to disturb them.

Individual variation is very pronounced in the adult and immature stages of plumage of this species. I have adult specimens now before me with the upper and under surface brown, with only the centre of the breast and abdomen indistinctly mottled with pale rufous; others again have the entire throat, breast and abdomen pale creamy-white, with dark brown shaft-stripes, and a paler subterminal streak in the centre. The largest and darkest adult bird in the Australian Museum Collection is a female obtained by Mr. George Masters, at Gayndah, on the Burnett River, Queensland, in August, 1870; wing measurement 15.3 inches. Some immature birds are distinguished by a broad creamy-white collar on the hind-neck; others have the entire plumage of the upper and under surface brownish-black, except narrow indistinct rufous margins to the scapulars, feathers of the back, rump and upper tail-coverts, the wings and tail being the same as in the adult.

Mr. Frank Hislop writes me as follows from the Bloomfield River District, North-eastern Queensland:—"The Brown Hawk is generally found in the forest land. I have taken two sets of eggs, one from a nesting place on the top of a fern, which was growing on an Ironwood tree. The fern was about twenty feet from the ground, and the eggs were just laid in a slight hollow in the top, without any nest at all. The other nest I found was in a big dead Tea-tree; a large hollow branch had broken off about two feet from the trunk, and in this the birds had laid. They generally lay three eggs, sometimes four. The birds usually come round about a bush fire and catch grasshoppers, lizards, small rats and mice."

From Copmanhurst, New South Wales, Mr. George Savidge writes me:—"The Brown Hawk (*Hieracidea orientalis*) is very sparingly dispersed throughout the Clarence River District, and I have only in a few instances found its nests and eggs, for it usually appropriates the deserted nest of a Magpie or Crow. It is an early breeder, eggs being mostly found during August and September."

Mr. Robert Grant has handed me the following notes:—"I found the Brown Hawk (*Hieracidea orientalis*) scattered all over the flats and clearings in the Lithgow District, on the Blue Mountains, New South Wales, and it seems to be very partial to the dead timber in ring-barked paddocks. At Bowenfels many years ago there was a great bush fire, and it attracted a large number of Brown Hawks and Kestrels, many of which I shot. On dissecting them, in every instance in both species I found their stomachs crammed with small half-burned lizards, also grasshoppers and other insects. Often when I have been Opossum shooting on moonlight nights, I have 'mooned' Brown Hawks on the branches of dead trees, and have frequently struck the tree trunks and thrown sticks at them before they would fly, and when they did they would not fly far away."

Writing from the Mossgiel District, New South Wales, the late Mr. K. H. Bennett remarked:—"With the exception of the Kestrel (*Tinnunculus senchroides*) the Brown Hawk (*Hieracidea orientalis*) is the commonest of the ACCIPITRES inhabiting this part of New South Wales, being met with plentifully both in the timbered and the open country. Although possessed of considerable powers of flight, it seldom seems to employ those powers in the capture of its prey, for it usually takes its station on some exposed point, a branch or tree or rail of a fence, and patiently watches for hours the advent of some reptile or young bird, upon which it immediately pounces and carries off to its perch to devour. It may at times be observed hovering in circles at a considerable height, but it is then only on the watch for some unwary reptile or young bird, such as Quail or 'Larks' (*Anthus australis* and *Cincloramphus cruralis*.) I have observed *Hieracidea orientalis* only on two occasions attempt to capture prey on the wing, one was the chase of a Quail, which it soon gave up as hopeless, the other was the capture of a *Podargus strigoides*, which I had just disturbed. As a rule its food consists chiefly of small reptiles, to which is added large insects, and such birds as it can capture by suddenly pouncing on them. The nest, which is built in any convenient situation, sometimes not more than eight or ten feet from the ground, is a rather deep cup-shaped structure composed of small sticks closely interwoven, and lined with decayed fine bark-fibre, wool, &c. Three or four eggs are laid for a sitting, usually the former, and when the young are first hatched they are covered with ferruginous-coloured down, which gradually assumes a leaden tint as the bird grows older. It breeds in August and September, and the young leave the nest about the end of October or beginning of November."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray writes:—" *Hieracidea orientalis* is common here, and its nests are usually found out from the creeks on solitary trees and in small tree clumps; it breeds mostly in August and September. On hot days in November, 1901, these birds were exceedingly numerous in the Gums along the creeks, food was plentiful in the shape of grasshoppers, and they evidently found the shade of the Gums very pleasant after a hearty meal. In a mile of creek there were as many as six to ten in every tree, the trees averaging about thirty yards apart. In November, 1909, when driving to the South Australian border, these birds were numerous in the paddocks which skirted the road, gathered together by the plentiful supply of grasshoppers. It was instructive to watch them running down the insects on foot, every short run, often with wings half extended, ending in a capture, the beak being used; sometimes short flights along the ground were made, when a more active prey endeavoured to escape. Nesting commences early in August, continuing until October, the majority being hatched out before the end of September. It breeds earlier than any of the Hawks other than the Wedge-tailed Eagle. Nests are usually found in the Gums along all the creeks, generally high up, a compact stick-built structure lined with rabbit fur or wool, or a mixture of both."

Mr. G. A. Keartland writes me as follows from Melbourne, Victoria:—"The Brown Hawk (*Hieracidea orientalis*) is scattered over the whole of Australia; I have seen it from Gippsland in

the south of Victoria to Kimberley in North-western Australia. When feeding their young they are very daring, and will seize Pigeons or half grown fowls in order to satisfy the cravings of their brood. I once saw one seize a Pigeon which was feeding in front of the Melbourne Town Hall, and after carrying its prey on to a ledge of the clock tower, proceeded to consume it in view of a large crowd of people who had witnessed the capture. These birds occasionally build their own nest, but more frequently utilise a deserted Crow's nest. Near Melbourne I have found their eggs during October and November. I took a set of Crow's eggs from a nest in a *Casuarina* on 6th November, 1893, at Werribee, Victoria, and fourteen days later found three slightly incubated eggs of the Brown Hawk in the same nest. On visiting the same nest a fortnight later I found the Crows had resumed possession and laid three eggs. In Western Australia a pair of these birds were busy feeding three young, in a tall tree near our camp, towards the end of July. Before daybreak the screams of the Hawks were heard as they passed over the camp to and from the nest, and although they worked incessantly until long after dark, the young ones were always hungry if the noise they made was an indication of the state of their appetites. During January, 1897, they were breeding at the Fitzroy River, Kimberley. They are fond of game, especially Quail, and if the grass happens to be set on fire by the natives, these birds immediately come to capture the lizards, mice or jerboas disturbed, and dashing through the smoke picked up a victim."

From Broome Hill, South-western Australia, Mr. Tom Carter writes as follows:—"By far the commonest bird of prey in Western Australia is the Brown Hawk (*Hieracidea orientalis*), being met with from the North-west to Albany, and is of a sluggish or tame disposition. Pairs of them frequently soar round and round at a considerable elevation, uttering their loud querulous cry. On one occasion at Point Cloates I found the remains of a Brown Hawk and White-headed Sea Eagle (*Haliastur girrenera*), their claws tightly entangled, both birds having fought to the bitter end. The nests are usually built in trees, but at Point Cloates (where there were no trees within about thirty miles) I have found the eggs laid in the broken tops of the large white-ant hills. Three is the usual clutch of eggs, occasionally four, and on one occasion I found five eggs in a nest. I have found them on various dates between 28th June and 1st September. At Broome Hill I took two young in down, and an addled egg, from the broken top of a White Gum, on 1st November, 1908. There was no nest formed."

The following information is extracted from notes made by Dr. Lonsdale Holden, while resident at Circular Head, Tasmania:—"On the 18th October, 1887, I took a fresh egg from a nest of *Hieracidea orientalis* on Circular Head Peninsula, in the top of a tall Tea-tree, about forty feet from the ground. It was in a scrub, and looked like an old Crow's nest, and was lined with bits of bark. No birds were about it, but the previous day one was seen to feed its mate while on the nest. Two days later I took two more eggs out of the same nest. The bird had slipped off the nest unseen, as the eggs were warm, and I saw her some thirty yards off while I was taking them. These birds are common; their note is a harsh cry not unlike a Black-cheeked Falcon's, but they are not so constantly noisy as that bird. On the 18th October, 1889, I found a nest on Circular Head Peninsula, in the head of a Tea-tree, about twenty-five feet from the ground, and some twenty yards from the nest taken in October, 1887. It contained three hard set eggs. The bird slipped off at once, and did not re-appear while I was there. On the 27th of the same month I found another nest in the top of a tall old Tea-tree, sixty feet or more from the ground, and one of an isolated clump without under-growth, and surrounded by grass-lands, so that the situation was a very exposed one as a breeding place. The bird flew right away from the nest when the trunk of the tree was struck with a stick, and made no attempt to defend her eggs, which were two in number and about half incubated." While resident near Hobart, in South-eastern Tasmania, Dr. Holden writes:—"On the 22nd November, 1904, on the hill side above Wentworth, Bellerive, Mr. Harrison climbed to a nest in the top of a tall

Gum-tree, about one hundred and twenty feet from the ground, and what we thought was a Crow's nest, but on his nearing it out flew two half-fledged young Brown Hawks, and a third remained in the nest. The young birds scrambled into concealment when they had fluttered to earth; at any rate we could only find one of them after a prolonged search, though the ground was by no means thickly covered with herbage and bushes. The one caught still had much down on the head and back, but the markings on what feathers had grown plainly show it to be *Hieracidea orientalis*. We saw nothing of the old birds."

The Brown Hawk usually appropriates the deserted tenement of another species for the purposes of breeding, more often that of a Crow or Raven, and not infrequently that of another bird of prey, but occasionally builds a nest for itself, and its eggs may be taken at a considerable altitude or within a few feet from the ground. As a general rule their nesting places are easily accessible, for their eggs are the commonest of all the Australian ACCIPITRES in collections. Inland, where unmolested, they will breed almost anywhere, from a lofty Eucalyptus to the crown of a Pine-tree ten or twelve feet from the ground. In response to a request Mr. H. G. Barnard, of Bimbi, Duaringa, Queensland, has favoured me with the following notes on the nests constructed by the Brown Hawk near his place, and from which he took sets of eggs, during the season of 1908:—"No. 1: Nest of sticks, very slight egg cavity, no lining of leaves, the eggs laid on bare sticks, external diameter eighteen inches, depth eight inches, height from ground fifty-four feet. No. 2: Formed of sticks only, top of nest flat, no egg cavity, measuring fifteen inches in diameter. The eggs were clearly visible from below, through the bottom of the nest; height from ground, seventy-five feet. No. 3: Formed of sticks, the egg cavity slightly lined with a few leaves, measuring externally twenty inches in diameter, depth ten inches; height from ground sixty-nine feet. I also took a set of Brown Hawks eggs from a disused nest of the Wedge-tailed Eagle (*Uroxtus audax*). The food of the Brown Hawk consists chiefly of small snakes and grass-hoppers. I have never seen them with birds or lizards. When I say small snakes, I have seen one of these birds kill one within a few inches of four feet long."

The eggs are usually three, occasionally four, and sometimes only two in number for a sitting, oval or rounded-oval in form, the shell being comparatively close grained, dull and lustreless. They are extremely variable in colour and disposition of their markings, but chiefly ranging from pink to reds and browns, and from an almost invisible freckle to large irregular-shaped blotches and clouded patches; on some the markings are evenly distributed over the surface of the shell, on others they form a large cap at one end, and the remainder of the shell may be entirely destitute of them, and frequently two types of eggs are found in the same set. Of a set of three taken by Dr. L. Holden at Circular Head Peninsula, on the north-west coast of Tasmania, on the 18th October, 1887, two are of a yellowish-buff ground colour, almost entirely covered by small irregular shaped markings of reddish-brown, which are confluent, forming a large cap on the thicker end of one specimen and the smaller end of the other; the remaining specimen has the ground colour of a reddish-buff, and the markings smaller and of a more decided and richer shade of red, forming confluent patches on the larger half of the shell, and measure as follows:—Length (A) 1.97 × 1.57 inches; (B) 1.98 × 1.6 inches; (C) 2 × 1.59 inches. Of a set of two taken by Mr. Frank Hislop in September, 1897, from the top of a fern growing on the side of a tree, in the Bloomfield River District, one has the ground colour reddish-buff, the other almost pure white, both being sparingly freckled on the larger end, and boldly blotched on the smaller end with light reddish-brown, and measure:—Length (A) 1.85 × 1.52 inches; (B) 1.95 × 1.54 inches. Of a set of four taken by Mr. H. G. Barnard, at Bimbi, Duaringa, Queensland, on the 13th September, 1908, two are of a rich reddish-buff ground colour, and have innumerable freckles and blotches of a darker shade of the ground colour; the others incline to a yellowish-buff, and are similarly marked with rich reddish-brown, the blotches being more thickly disposed, larger and darker on the thicker end. They

measure:—Length (A) 2.23×1.58 inches; (B) 2.27×1.61 inches; (C) 2.17×1.61 inches; (D) 2.17×1.57 inches. An unusual marked set of two, taken by the late Mr. K. H. Bennett, at Mossgiel, New South Wales, on the 9th September, 1885, are of a faint buffy-white ground colour, minutely freckled and boldly blotched with reddish-brown, intermingled with similar markings of a purplish-brown hue on one specimen, and rich reddish-black on the other, and closely resembling miniature eggs of the White-headed Osprey (*Pandion leucocephalus*):—Length (A) 2×1.57 inches; (B) 2.06×1.57 inches.

Nestlings, when about three weeks old, are covered above and below with whity-brown down, exposed portions of the tips of the quills and tail feathers dark brown with rufous margins.

Young birds are dark brown above with dull rufous margins to the tips of the feathers of the back, rump and the scapulars, upper wing and upper tail-coverts; tips of the inner secondaries and largest primaries pale rufous, passing into fulvous white on the external edges; tail-feathers greyish-brown tipped with pale rufous, and strongly barred across the centre of the webs with darker rufous; forehead, crown of the head and nape brown, with the remains of white down at the tips of some of the feathers; median portion of the feathers on the nape pale fawn, their bases white; feathers above and behind the eye, and those on the sides of the neck pale fawn streaked with black, the hinder portion of cheeks a deeper fawn and more sparingly streaked; fore portion of cheeks black; throat pale fawn; remainder of the under surface brown mottled with cream-fawn colour; under tail-coverts cream-fawn colour, the longer ones with a broad subterminal brown cross-bar. Total length 16 inches, wing 10, tail 6.

August and the four following months constitute the usual breeding season of this species in Eastern Australia and Tasmania, their eggs being more commonly found in August and September on the continent, and in October in Tasmania.

Genus CERCHNEIS. *Boie.*

Cerchneis cenchroides.

NANKEEN KESTREL.

Falco cenchroides, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 183 (1826).

Tinnunculus cenchroides, Gould, Bds. Austr., fol. Vol., pl. 13 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 35 (1865).

Cerchneis cenchroides, Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 431 (1874); *id.*, Handl. Bds., Vol. I., p. 276 (1899).

ADULT MALE.—*General colour above pale rufous, the feathers of the head and hind-neck being centred with bluish-grey, and having a narrow black shaft line, the scapulars and innermost secondaries having a small sagittate black marking towards the tips; primaries blackish-brown, notched with white on their inner webs for two-thirds of their length, the centres of the notches being edged with rufous on the apical half of the feather; the three innermost primaries margined with pale rufous at their tips, becoming narrower on the next three on either side, and passing into white on the extreme edge; rump, upper tail-coverts and tail-feathers bluish-grey, the latter edged with rufous and tipped with white, and crossed near the extremity by a distinct broad black band, except on the external feather, where the marking is confined to the inner web; face whitish, the ear-coverts washed with grey; a narrow superciliary line and an oblique stripe on either side of the throat blackish-grey; all the under surface white, the fore-neck, breast and flanks with blackish shaft stripes, and faintly washed with pale rufous; under tail and under wing-coverts pure white; bill pale bluish-horn colour, darker at the tip of the upper mandible; cere and skin around the eye dull yellow; legs and feet*

chrome-yellow, claws black, iris hazel. Total length in the flesh 12·5 inches, wing 9·3, tail 6, bill 0·7, tarsus 1·55.

ADULT FEMALE—*Similar in plumage to the male, but having the head pale rufous, with black shaft streaks: the secondaries and greater wing-coverts crossed with broad blackish-brown bands: tail-feathers of a lighter rufous than the back, transversely barred with black, and having a broad subterminal black band. Total length in the flesh 13·5 inches. Wing 10·5 inches.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Tasmania.

THE type of the present species was described by Messrs. Vigors and Horsfield in the "Transactions of the Linnean Society of London," in 1826, from specimens obtained near Sydney in the early days of the settlement of New South Wales, and quoting the following remarks of the collector, Mr. Caley, who resided at Parramatta:—"This bird is called 'Nankeen Hawk' by the settlers. It is a migratory species. My specimens were shot in May and June, 1803. At that time the species was plentiful, but ever afterwards I observed it but sparingly. . . I never observed it attacking the fowls."

It is generally distributed in favourable situations over the greater portion of Australia, and is likewise found in Tasmania, and has been recorded in nearly every collection of any size formed in different parts of the continent. There is little or no variation in specimens obtained in widely separated localities, except that due to age. Some adult birds of both sexes have the under surface almost pure white, with dark brown shafts to the feathers, except on the centre of the lower breast, abdomen and under tail-coverts, and are destitute of the usual pale rufous wash to the upper breast and flanks. Some adult males, probably very old birds, have the feathers on the crown of the head and nape entirely grey, but having the same black shaft lines: others have the outer webs of the greater wing-coverts spotted with pale rufous, and which extends to both webs of the primary coverts of some specimens. The wing-measurement of adult males varies from 9·3 to 9·5 inches, and that of adult females from 9·8 to 10·5 inches.

As in Caley's time it still haunts the neighbourhood of Sydney, but it is not plentiful, and may be more frequently observed on the heath lands about Randwick, La Perouse and Long Bay, principally during the summer and autumn months, than elsewhere. During the same periods of the year I have also frequently noted it close to Melbourne, hovering a few feet above the grass and weed-covered land of what was originally the North Melbourne Swamp. In the comparatively neighbouring districts of Matibynong and Keilor Plains, at midday on the hottest days in summer, the Nankeen Kestrel was frequently the only moving object to be seen in the landscape, the apparent waves of heat just above these grass lands causing every living thing beside to seek refuge from the sun's glare. In similar country it was unusually plentiful while crossing the Breeza Plains, in New South Wales, several times during November, and was also common on the Namoi and Gwydir Rivers. It also frequents open forest-lands, and heavily-timbered mountain ranges. Take a fairly long distance journey by road or rail in New South Wales, during the spring or summer months, anywhere across plains, one is almost certain to meet with it, usually being attracted to it by its light colour and graceful actions while hovering in search of prey. It may be also met with in deep gorges and precipitous cliffs of our mountain ranges. The accompanying figure is reproduced from a photograph taken by me of a well known haunt of these birds near Leura, on the Blue Mountains, New South Wales.

The crops and stomachs of many specimens examined, show that insects of various kinds and small reptiles constitute its chief food. The late Mr. Henry Newcombe, of Randwick, near Sydney, a constant contributor of specimens from that locality for over a quarter of a century, and especially of the ACCIPITRES, TURNICIDÆ and RALLIDÆ, obtained an adult male and female

* Trans. Linn. Soc., Vol. XV., p. 183 (1826.)

in May and June, and I found the stomachs of both crain ne1 with the remains of mole crickets and dragon flies; also, in the crop of the latter, two perfect small lizards. Mr. G. Savidge has also noted it preying on field mice and small birds.

During a visit to Cobborah Station, Cobbora, New South Wales, in October, 1909, several pairs of these birds were seen; Mr. Thos. P. Austin climbed to one of their nesting places in a hollow limb of a Red Gum, about twenty feet from the ground, on the 14th October, containing



A HAUNT OF THE NANKEEN KESTREL ON THE BLUE MOUNTAINS.

three fresh eggs, on which the bird was sitting. Apparently this was the full complement, as on making an examination several days later the bird was still found sitting on the three eggs. Two days later Mr. Austin scooped a set of four eggs from a nesting place in a hollow spout of another tree. All the nesting places found by him were in holes in trees, and four eggs constituted the usual sitting.

From Copmanhurst, on the Upper Clarence River, New South Wales, Mr. Geo. Savidge writes me:—"The Nankeen Kestrel (*Cerchneis cenchroides*) is fairly common on the river flats, and cane and maize fields of the Clarence River. I have noticed several at Yamba, Clarence Heads, also on the upper reaches of the Clarence River, but

nowhere is it so numerous as in the western districts of the State. Mice seem to form their favourite article of food, but an occasional small bird is readily eaten by them; also beetles and grubs. It breeds here in the hollow spout of some dead tree, and lays during September, October, November and December, the usual clutch being four. I found five eggs on one occasion."

From Broken Hill, in South-western New South Wales, Dr. W. Macgillivray writes me:—" *Cerchneis cenchroides* is plentifully distributed throughout the district, finding its living on the

open plains, whether covered with saltbush, grass or stunted scrub, poised in the air for a minute, then dropping down to investigate whatever has attracted its attention, or to capture something of food value, such as grasshoppers, crickets and other insects, lizards and small snakes, mammals such as mice, and the young of ground breeding birds. Nesting usually commences early in September, but few eggs are laid before the middle of that month, and continues until the end of October. The usual site is a large open hollow in one of the creek Gums, the eggs being deposited on the decayed wood and earthy matter usually found in such places. They sometimes take possession of an old nest of Crow, Brown Hawk or some other bird, and very rarely build a nest for themselves, which is usually of sticks and twigs compactly put together, of greater depth than that of the Magpie, and lined with fur and wool. I once took a clutch of four eggs from such a nest, built in a Gum sapling, and a clutch of five Short-billed Crows eggs (*Corvus bennetti*) from a nest in an adjoining tree. Three weeks later, on again visiting the locality, I found that the Kestrel had taken possession of the Crow's nest, in preference to her own, and there were four partially incubated eggs." Writing of the birds of the Cloncurry District, Northern Queensland, Dr. Macgillivray says:—"The Kestrel is very common, usually nesting in hollow trees or on debris left in a tree by flood waters. My brother was once camped for some days near a tree in which was a Kestrel's nest with young, and frequently saw the birds bring small snakes, from one to two feet in length, to the nest."

Writing from Mossgiel, New South Wales, the late Mr. K. H. Bennett remarked as follows:—" *Tinnunculus ceachroides* is an extremely common species, being met with everywhere in the district. Its powers of flight are considerable, but like *Hieracidea orientalis* is seldom, if ever, used in the capture of its prey. It is a very active bird, and may frequently be observed poised on outstretched and quickly vibrating wings, whilst it scrutinises the ground beneath. Should the movement of some insect or small reptile attract its attention, it is unerringly pounced on, and either devoured on the spot or carried off to some perch to be eaten at leisure. It breeds in September, generally taking possession of the disused nest of another species, but more often that of *Corone australis*. Occasionally it deposits its eggs, Parrot like, in a hole in a branch or trunk of a tree."

While resident later on at Yandembah Station, in the Lachlan District, New South Wales, Mr. Bennett wrote:—"On the 18th October, 1899, I found *Tinnunculus ceachroides* had taken possession of a disused nest of the White-winged Chough (*Corcorax melanorhamphus*), and it contained three Kestrel's eggs. This is a very unusual site. Another pair constructed their nest, from which I took three eggs, in the drum of a whim close to the house. Last year a pair of Ravens (*Corone australis*) built in the drum, but I pulled the nest out and destroyed it, so the Kestrels have been the sole builders of the nest this year."

From Orange, New South Wales, Mr. E. H. Lane writes me:—"The Kestrel (*Tinnunculus ceachroides*) is very common in the Orange and Dubbo Districts. According to my experience four eggs constitute the usual clutch, though I have heard of five being found on several occasions. I have always taken them from hollow limbs, lying on decayed wood."

From Melbourne, Victoria, Mr. G. A. Keartland writes me as follows:—"The pretty little Nankeen Kestrel is a great favourite of mine, and should be held in good repute by all dwellers in the country. These birds are, as a rule, perfectly harmless so far as chickens are concerned, but are great hunters of mice, crickets, lizards and grasshoppers. Whilst the Kestrel is found throughout Australia, they are most numerous in the agricultural portions, where they may be seen flying round the hay stacks, or fluttering over the stubble in search of mice. I have seen as many as seventeen of these birds flying over a field of fifty acres, sometimes skimming close to the ground, and at others, by a slight quiver of the wings, remaining almost stationary for several minutes, they drop like a stone on to their victims, which they carry to the nearest tree or fence to consume. The Kestrel does not build a nest for itself, but lays its eggs in the

deserted nest of the Grey Magpie, etc. They often choose a hollow branch in which to deposit their eggs. When on the Calvert Exploring Expedition, in Western Australia, in August, 1896, I noticed a Kestrel fly from the hollow limb of a Gum tree near our camp on Brookman Creek. On examining the nest I was surprised to see that the clutch of four eggs was lying on a mass of camels' dung, with which the hollow limb had been lined. They make excellent pets, and their chaste colouring and graceful movements render them very attractive. So far as I am aware, this is the only Australian member of the ACCIPITRES which deposits its eggs in a hollow tree."

Dr. A. M. Morgan writes as follows from Adelaide, South Australia:—" *Tinnunculus cenchroides* is common in all parts of South Australia. At Laura I shot a number of birds near the township to find out if they were taking the chickens, as they were accused of doing. In no case did I find the remains of chickens in their stomachs, but always mice. They bred there in hollow trees as a rule, but I found one breeding in an old *Gymnorhina leucanota* nest. The young Magpies had just left the nest, and were still perching and being fed in the same tree. There were plenty of hollow trees about which they might have used had they wished to. At Mount Gunson I saw a pair flying about a hole in a cliff, but could not get at it to see if they were nesting."

From Broome Hill, South-western Australia, Mr. Tom Carter writes:—"The Kestrel (*Cerchneis cenchroides*) was a common bird about Point Cloates and the North-west Cape, laying its eggs in hollow Gum spouts, the broken tops of white ant hills, or on ledges of cliffs along the beach or in the ranges, without making any nest, but occasionally eggs were found in an old Crow's nest. The clutch is three to five in number, and I think two broods of young are sometimes reared in a season. Eggs have been noted from 1st August to 1st November. The birds are to some extent crepuscular, as a pair that took up their quarters at my shearing shed were often observed catching beetles, etc., until it was quite dark. I have only seen one pair of Kestrels as yet at Broome Hill during four years' residence."

Mr. Chas. G. Gibson writes me:—"At Laverton, Western Australia, on the 12th October, 1905, I found a nesting place of *Tinnunculus cenchroides* in a hollow limb of a desert Gum, containing one fresh egg. Three days later I found two eggs, and two days later again three eggs. Apparently two days elapse between laying of eggs. A nesting place I found on the 13th October, in a hollow vertical stump of a dead Gum, contained four small young. Examining this nest two weeks later I found two young birds apparently able to fly, and the remains, bills and feet, of the other two."

Dr. Lonsdale Holden, while resident at Circular Head, on the north-west coast of Tasmania, wrote:—"I saw *Tinnunculus cenchroides* for the first time at Circular Head on the 20th September, 1887. It lit on stones on these bare down-like hills above the sea, and allowed cautious approach within gunshot two or three times, flying off then to another stone at a little distance."

This species usually deposits its eggs, four or five in number for a sitting, on the decaying wood in a hollow limb or trunk of a tree, on dry dust in a hole or crevice of a rock, or in the disused nest of another bird, but more frequently the Raven and Crow. The accompanying figure is reproduced from a photograph taken by me on Cobborah Station, Cobborah, in October, 1909.

The eggs vary from rounded-oval to oval in form, some specimens being somewhat abruptly pointed at the smaller end, the shell being close-grained, smooth and more frequently lustreless. They are extremely variable in the character and disposition of their markings, and very frequently two distinct types of eggs are found in the same nest. The ground colour varies from reddish-white and pinkish-white to buffy-white and pure white, which is usually more or less obscured with numerous freckles, spots and blotches of rich reddish-brown. On some the markings are of a pronounced brownish-hue, on others of a pale red or pinkish-red; some specimens are evenly marked all over, on others they are intermingled with large blotches at

either end. A set of four taken by the late Mr. K. H. Bennett, at Yandembah Station, in the Lachlan District, New South Wales, on the 22nd July, 1889, measures:—Length (A) 1.47 × 1.2 inches; (B) 1.55 × 1.22 inches; (C) 1.5 × 1.23 inches; (D) 1.5 × 1.2 inches. The latter egg is reproduced on Plate B. XVI., figure 11. A set of four taken in the same locality on the 16th September, 1890, measures:—Length (A) 1.45 × 1.19 inches; (B) 1.54 × 1.22 inches; (C)



TAKING EGGS FROM A NEST OF THE NANKEEN KESTREL.

1.5 × 1.2 inches; (D) 1.49 × 1.25 inches. The latter specimen is reproduced on Plate B. XVI., figure 12. A set of four taken by Dr. W. Macgillivray and Mr. W. McLennan at Yalcowinna Creek, thirty-five miles north of Broken Hill, in South-western New South Wales, on the 9th September, 1907, measures:—Length (A) 1.44 × 1.17 inches; (B) 1.4 × 1.16 inches; (C) 1.43 × 1.15 inches; (D) 1.42 × 1.2 inches. A set of five taken in the same locality on the 13th October, 1906, measures:—Length (A) 1.51 × 1.2 inches; (B) 1.52 × 1.19 inches; (C) 1.52 × 1.15 inches; (D) 1.47 × 1.22 inches; (E) 1.43 × 1.22 inches.

Recently hatched young are clothed in pure white down, bill and cere white, legs and feet pale yellow.

Young birds resemble the adult female, but have the feathers of the rump and the upper tail-coverts rufous, which together with those of the lower back have blackish sagittate markings in the centre; tips of all the quills pale rufous, passing into white on the extreme edge; scapulars, greater wing-coverts and innermost secondaries rufous, with broad blackish cross-bars; tail-feathers rich rufous, more broadly barred with black, and with large

whitish tips washed with rufous; head and hind-neck and upper back light rufous, streaked with black more broadly on the latter; chin, cheeks and throat white, with a blackish malar stripe; remainder of the under surface dull white, with narrow blackish shaft-stripes, the foreneck, upper breast and sides of the body pale cream washed with warm buff; under tail-coverts dull white; under wing-coverts pure white. Total length 10.5 inches, wing 6.6, tail 4.4.

August and the four following months constitute the usual breeding season, and eggs may be found from August to the end of October. In 1889, when the late Mr. K. H. Bennett took eggs on the 22nd July, on Vandembah Station, Lachlan District, New South Wales, it was an unusually wet season, following a period of several years' drought in that locality, and many species were found breeding in May and June that normally did not commence to nest until August.

Sub-order PANDIONES.

Genus PANDION, *Savigny*.

Pandion leucocephalus.

WHITE-HEADED OSPREY.

Pandion leucocephalus, Gould, Syn. Bds. Austr., pt. III., pl. 6 (1838); *id.*, Bds. Austr., fol. Vol. I., pl. 6 (1848); *id.*, Handbk. Bds. Austr., Vol. I., p. 22 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. I., p. 451 (1874); *id.*, Hand-l. Bds., Vol. I., p. 279 (1899).

ADULT MALE.—*General colour above brown, most of the feathers being darker on the median portion and narrowly edged with brownish-white around the tips; upper wing-coverts, secondaries and innermost primaries like the back; remainder of the primaries brownish-black, darker on their apical portion, their inner webs narrowly edged with pale brown; tail-feathers brown, darker on their apical portion, and narrowly tipped with brownish-white, all but the central pair toothed or notched on their inner webs with white; head white, lores dusky brown; ear-coverts and some of the feathers on the sides of the neck, and a few scattered feathers on the centre of the crown of the head and hind-neck blackish-brown, the margins of some of the latter feathers, as well as those on the lower sides of the neck edged with pale brown; all the under surface and under tail-coverts white, the feathers on the foreneck pale rufous-brown in the centre, and most of them having narrow blackish shaft streaks; bill black; cere lead colour; legs and feet pale bluish-white; iris bright yellow. Total length 22 inches, wing 16.5, tail 8.5, bill 1.5, tarsus 2.25.*

ADULT FEMALE.—*Similar in plumage to the male, but larger. Total length 26 inches; wing 19.5 inches.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia, Tasmania.

THE White-headed Osprey is generally distributed over the coast-line of Northern, Eastern and Western Australia, becoming rarer in the south-eastern and southern portions of the continent, although it is found on some of the larger islands of Bass Strait, and as far south as Southern Tasmania. It also occurs on the islands of Torres Strait and South New Guinea and Solomon Islands, and according to Count Salvadori in the Aru Islands, New Ireland, the Moluccas and Celebes. In Australia it is nowhere more abundant than on the eastern coast and adjacent islands of Queensland and the whole of the coast line of Western and North-western Australia, the above description being taken from a pair of birds collected at King George's Sound, by Mr. George Masters, on behalf of the Trustees of the Australian Museum. Among other specimens in the Collection are examples obtained by the late Mr. J.

* Orn. Pap. et Molucc., Pt. I., p. 11 (1850)

A. Thorpe, on Fraser Island. Gilbert found it breeding on Kottnest Island, in Western Australia, also at Port Essington, in the Northern Territory of South Australia, and it has been recorded by many observers on different parts of the coast line of Australia and the adjacent islands. During a trip made to Houtmann's Abrolhos, lying off Geraldton, Western Australia, by Mr. C. G. Gibson and party, in 1908, it was found breeding on several of the islands, but at that time all the nests contained young, no less than eight nests being found on Pelsart Island. At Point Cloates, North-western Australia, Mr. Tom Carter during a long residence observed that nearly a score of pairs of birds nested every season on different parts of his station, both on the coast and inland. Further north the late Mr. T. H. Bowyer-Bower obtained specimens at Derby, and Mr. G. A. Keartland, while a member of the Calvert Exploring Expedition, met with it on the Fitzroy and Margaret Rivers in the early part of 1897. On the opposite side of the continent, further north, Mr. George Masters informs me that it was found breeding by the members of the Chevert Expedition, fitted out by the late Sir William Macleay in 1875, a handsome pair of eggs in the Macleay Museum, at the University of Sydney, being taken by an Aboriginal from a nest in the topmost branches of a Gum-tree on an island in Torres Strait. Farther south Mr. Frank Hislop found it breeding in the Bloomfield River District, North-eastern Queensland. In the early part of 1909 Mr. H. Neilson, collecting on behalf of Mr. H. L. White, of Belltrees, Scone, New South Wales, found a large number of nests on the islets inside the Barrier Reef, and in the neighbourhood of St. Laurence, Bowen and Mackay, and Mr. John Ramsay found it breeding on the Mary River and Brisbane River. In Northern New South Wales I saw a pair of these birds "fishing" between the Tweed River and Cook Island, and at St. George's Basin, in the Illawarra District, I am informed a pair of these birds have bred in a lofty Gum for many years; there are also several unlocalised specimens in the Old Collection of the Australian Museum, procured in different parts of the State. From South Australia Mr. Edwin Ashby sends me a note of his obtaining a specimen about three miles from Blackwood, South Australia, and of his taking eggs from a rock near Middle River, on Kangaroo Island. Dr. Lonsdale Holden sent me a note that the Rev. H. S. Atkinson, on the 27th September, 1886, observed an Osprey perched on a telegraph post between Circular Head and Rocky Cape, Tasmania, and Mr. E. D. Atkinson observed it in the D'Entrecasteaux Channel, in the south-eastern portion of that island, and has eggs in his collection that were taken on King Island, Bass Strait.

There is little or no variation in adult specimens obtained in different parts of the continent, but an example in the Australian Museum Collection has no white notchings to the inner webs of the tail-feathers.

From the Bloomfield River District, North-eastern Queensland, Mr. Frank Hislop writes me as follows:—"The White-headed Osprey generally builds on a dead tree in the forest land. I only knew of two nests on the Bloomfield River, and the birds have been using them every season for a great many years. A black boy went up one of the trees and got one egg, but the other tree is not safe to climb, as it is very rotten. I do not know how many eggs they usually lay, but they are seldom seen feeding more than one young bird. Both nests are a good way from the sea. These birds live on fish."

Mr. H. L. White, of Belltrees, Scone, New South Wales, has a large series of these handsome eggs in his collection, and has supplied me with the following interesting notes:—"Mr. Henry Nielson, of Mackay, Queensland, while employed by me collecting during 1909, observed upwards of thirty nests of *Pandion leucocephalus* upon the islands inside the Barrier Reef, in the vicinity of Bowen, Mackay and St. Laurence, sailing nine hundred and twenty miles in a small three ton cutter during May, June and July. Nesting sites were about equally divided between trees and rocks; when the first named is chosen, the tree is invariably a broken-topped one; many of the nests on rocks were placed a few feet only above high water

mark, while others were on inaccessible cliffs. One remarkable nest, found on the cliffs of a small island, was over five feet in height, and had apparently been used for many years. With a single exception the nests were substantially built, in one case a few sticks only were used on a rock just above high water mark. The number of eggs to the clutch was always two or three; they present a great variety in shape and colour, but to see the colour at its best the eggs must be quite fresh; they rapidly lose their bright shades when sat upon. In two instances second clutches were taken, the birds occupying two months in rebuilding. On one occasion a nest was observed which contained one young bird and two fresh eggs, the nestling being covered with ants, which apparently caused it no inconvenience. In several instances the bird was seen sitting for several days before an egg was laid. Ospreys' nests vary a lot in size, some being as high as five feet, others (on the rocks only) are barely six inches, just a few sticks round the bare rock; those in trees are much alike, and usually well constructed; the lining generally consists of a few Pandanus or other leaves, or washed up seaweed. The prettiest nest I have seen was lined with moss and leaves of the Bloodwood tree. On the main land a dead tree is preferred, except in the mangroves, where it is usually a dead-topped tree. In all Mr. Nielson observed twenty-eight nests, each containing two or three eggs, and about fifteen with young birds. While a nest is being robbed, the female bird frequently flies round uttering a sort of whistling cry. Upon one occasion only was a bird seen to plunge out of sight in water and reappear with a fish in its claws. The eggs give out a disagreeable fishy odour. The first nest found with eggs was on 6th May, the last 28th July."

Mr. G. A. Keartland, of Melbourne, Victoria, has sent me the following note:—"Near Carnarvon, Western Australia, many Ospreys (*Pandion leucocephalus*) may be seen on the coast searching for dead fish or other offal cast up by the sea. Although their nests are usually built on rocks and trees in the vicinity of water, Mr. Tom Carter found one on a boulder in the open plain, about three feet from the ground, in which there were four eggs. This was remarkable considering that a high range existed about a mile away."

From Blackwood, South Australia, Mr. Edwin Ashby sends me the following note:—"I have a specimen of *Pandion leucocephalus* shot about three miles from my house, in the gorge of the Sturt, five or six miles from the coast, the only water being a small rivulet. The bird had a well filled crop of English Perch. I was informed that it had frequented the locality for several weeks. I took two eggs in conjunction with a friend from a rocky islet, separated from land by water, except at low tide, near Middle River, Kangaroo Island, in October, 1905. The nest was a cart load of sticks."

Mr. Tom Carter writes me as follows:—"The White-headed Osprey (*Pandion leucocephalus*) was fairly plentiful about North-west Cape and Point Cloates, North-western Australia. Their bulky nests were built sometimes on the edges of great cliffs, in the large Red Mangrove trees, and occasionally on the bare surface of the salt marshes. I have also seen nests built on boulders or dead logs, on the beach, just above high water mark. Eggs have been noted from 25th June to 3rd September about Point Cloates. Two or three is the usual clutch, but I once found four eggs in a nest. A nest built in the top of a dead Mangrove, near the North-west Cape, became of such immense size after many years of adding to it, that eventually the tree was blown down. Another nest, built on a large log on the beach, was a little more than five feet in depth, *i.e.*, height of the structure, by standing on tip toe on the log, I could just look over the edge of the nest. The old birds usually circle round above the heads of any intruders at their nests, but never offer to attack. A pair built their nest on the top of a crane on the end of Maud's Landing Jetty, about thirty miles south of Point Cloates, the jetty being little used, except for a few weeks in the wool season. These birds occur sparingly near Albany, Denmark, and Cape Mentelle, in South-western Australia."

With the photograph of the nest of the Osprey here reproduced, Mr. Chas. G. Gibson has kindly sent me the following notes from Western Australia:—"The photograph of a nest of *Pandion leucocephalus* was taken on Pelsart Island, Houtmann's Abrolhos, off Champion Bay, Western Australia, 11th November, 1907. Nests were seen on almost every island; on those visited they were usually placed some distance back from the sea, in distinction from those of the White-bellied Sea Eagle (*Haliaetus leucogaster*), which were placed right at the water's edge. The nests varied in height from one foot to four feet, and were composed of all the odds and ends available, and which could be picked up on the beach, viz., sticks, pieces of board, straw bottle envelopes, sponges, seaweed, cuttlefish, pieces of coral, etc., in fact anything and everything that drifted on to the beach; tops of nests were slightly hollowed and roughly 'lined' with a little seaweed. Although the eggs are usually three in number, a full brood is apparently rarely raised, as in no case were more than two young noted, and occasionally only one. At the time



WHITE-HEADED OSPREY'S NEST ON PELSART ISLAND, HOUTMANN'S ABROLHOS, WESTERN AUSTRALIA.

of our visit in November the nests all either contained young of varying size or else the young birds were flying about; no eggs were obtained. The photograph is typical."

Mr. E. D. Atkinson sends me the following notes from Tasmania:—"I have seen *Pandion leucocephalus* in D'Entrecasteaux Channel, in the south-east, but nowhere else have I observed it. On one occasion I remember an Osprey flying to a tree with a fish in its talons: the bird was shot at and flew away unhurt, but dropped the fish, which proved to be a fine mullet. I have the eggs from King's Island, Bass Strait, so the bird must occur there."

The eggs are usually three, occasionally only two, and rarely four in number for a sitting, and are extremely variable in shape and disposition of their markings, even in the same set; they vary from elongate-oval to thick and almost rounded-oval in form, some specimens gently tapering towards the smaller end, but abruptly pointed examples are rare, the shell being

comparatively smooth, of a chalky nature, and lustreless. In ground colour they vary from a rich yellowish or pale brownish-white to fleshy or buffy-white and almost pure white, which is heavily blotched and spotted with different shades of rich reddish or purplish-brown; sometimes the markings are large and confluent, and confined chiefly to the larger end, where they form irregular caps, or less frequently a zone; in some specimens these markings are large, patch-like and uneven, and different shades of colour partially overlie one another; in others the markings consist of freckles, dots, spots and small irregular-shaped blotches of dull light red, uniformly distributed over the surface of the shell, while many have fainter underlying markings of purple and purplish-grey, the underlying markings outnumbering the surface ones in some specimens. Of three sets in the Australian Museum Collection, a set of two taken by Mr. John Ramsay in the Wide Bay District, Queensland, on the 15th August, 1880, measures:—Length (A) 2.56 × 1.73 inches; (B) 2.57 × 1.72 inches. This set of eggs was heavily incubated, and the latter specimen is represented on Plate B. XIV., fig. 7. A set of three taken by Mr. Ramsay at Indah, on the Mary River, Queensland, measures:—Length (A) 2.27 × 1.7 inches; (B) 2.27 1.68 inches; (C) 2.31 × 1.68 inches. This set was fresh, and the former is represented on the same Plate, fig. 9. A set of three taken on a small island lying off Cape Leeuwin, Western Australia, in 1888, measures: Length (A) 2.52 × 1.73 inches; (B) 2.43 × 1.78 inches; (C) 2.41 × 1.77 inches. The latter is a remarkably handsome specimen, and is represented on Plate B. XIV., fig. 6. A set of three, taken by Mr. Henry Nielson on an islet almost adjacent to Goldsmith Island, in the Sir James Smith Group, off the eastern coast of Queensland, measures:—Length (A) 2.3 × 1.75 inches; (B) 2.33 × 1.78 inches; (C) 2.32 × 1.77 inches.

In Queensland Mr. H. Nielson found eggs in May, June and July, while farther south, on the Mary River, Mr. John Ramsay obtained eggs in August. In North-western Australia Mr. Tom Carter has taken eggs from June to September, but more often in July, and on Houtmann's Abrolhos Mr. Chas. G. Gibson found only young birds in the nests in November.

ORDER STRIGES.

Family BUBONIDÆ.

Sub-family BUBONINÆ.

Genus NINOX. *Hodgson.*

Ninox boobook.

BOOBOOK OWL.

Strix boobook, Lath., Ind. Orn., Suppl. II., p. xv. (1790).

Athene boobook, Gould, Bds. Austr., fol. v., Vol. I., pl. 32 (1818).

Spiloglanis boobook, Gould, Handbk. Bds. Austr., Vol. I., p. 71 (1865).

Ninox boobook, Sharpe, Cat. Bds. Brit. Mus., Vol. II., p. 168 (1875); *id.*, Hand-l. Bds., Vol. I., p. 291 (1899).

ADULT MALE.—*General colour above dull brown with a slight dusky tinge, the scapulars and the apical portion of the upper wing-coverts having rounded white spots, those on the lesser wing-coverts and hind-neck smaller and less distinct and of a fulvous-white; the rump and upper tail-coverts, showing the remains of spot-like white bars, less distinct on the latter; quills brown, banded across with darker brown, and having rounded white spots on their inner webs, which are larger on the innermost secondaries; the second, third and fourth primaries with a spot-like white marking near the centre of the outer web; tail-feathers brown barred with darker brown, indistinctly margined around the tips with brownish-white, the paler brown interspaces on the inner webs of all but the central pair pass into white spot-like bars on the basal portion of the feathers, which is better defined on the outermost feather on either side; orbital region and ear-coverts brown; lores, forehead and line of feathers extending over the anterior portion of the eye white, the former with well-defined black shaft streaks; chin, cheeks and feathers partially encircling the ear-coverts whitish, the latter narrowly streaked with fulvous, as are also the feathers on the crown of the head; feathers on the foreneck brown, margined on either side with fulvous; remainder of the under surface brown shaded with rufous, all the feathers broadly and irregularly margined with white at the sides, many of the markings, particularly on the lower sides of the body, assuming a conjoined, rounded spot-like form; under tail-coverts white with an irregular-shaped fulvous-brown marking down the centre, which is almost obsolete on some of them; outer edge of the centre of the wing white; under wing-coverts brown, margined with ochraceous, the lower ones mottled with white; bill bluish-horn colour, blackish at the sides and tip; feet fleshy-grey, sparingly covered with fine spine-like whitish bristles; iris, yellow. Total length in the flesh 13 inches, wing 9.4, tail 6, exposed portion of bill 1, tarsus 1.65.*

ADULT FEMALE.—*Similar in plumage to the male, but slightly larger, and frequently more largely spotted with white on the upper wing-coverts and scapulars. Wing 10.2 inches.*

Distribution.—Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia.

IN favourable situations the Boobook Owl is generally distributed over all but the northern and north-western portions of the Australian Continent, and nearly everywhere, whether in Central Australia, or in the coastal districts, it may be found wherever the timber is provided with spouts and hollow limbs sufficiently large enough to admit it for the purpose of breeding. Although so widely dispersed, it is not so common as its wide range would lead one to expect, and its well known note "boo-book" is far more frequently heard than the bird is seen.

As pointed out by the late Dr. R. B. Sharpe, Latham's descriptions of the type of the present species is founded upon one of Watling's paintings, made in Sydney during the early days of the



BOOBOOK OWL.

settlement of New South Wales, and which is now in the British Museum. There is a great variation in colour, especially of the upper parts, some being very much darker than others procured even in the same Locality. As in Watling's days, it is still to be found in the heart of the city and the surrounding suburbs, the above description being taken from an adult male procured by the late Mr. Henry Newcombe at Randwick. Very much darker on the upper parts is an adult male procured by Mr. J. Stein at Smithfield, as is also an adult female presented by the Deputy Town Clerk, Mr. W. G. Layton. This bird flew in broad daylight, in the early part of September, 1908, into the entrance of the Town Hall, George Street, Sydney, where it was captured. In the Australian Museum Collection there are a number of specimens from all of the Australian States, Mr. George Masters obtaining examples from Mongup, Salt River, Western Australia, to Wide Bay, in Queensland; by far, however, the greater number

were obtained in the neighbourhood of Sydney. Individual variation exists, too, in the amount of white on the face, examples from the Lachlan River, New South Wales, procured by the late Mr. K. H. Bennett, having a more pronouncedly white face, and more white on the underparts, than others procured near Sydney; so also have specimens obtained by Mr. G. A. Keartland at the Finke River and Alice Well, in Central Australia, in 1894, during the visit there of the Horn Scientific Expedition.

It is chiefly nocturnal in habits, resorting to hollows of trees, crevices in rocks, or boughs sheltered with dense foliage, during the day time, and seeking for its food about dusk or when moonlight, its prey consisting principally of large insects, small mammals, birds and land crabs. Stomachs examined contained the remains of insects, mice and small birds. One obtained at Boloco, in July, 1901, had the remains of carapaces and claws of land crabs, also a number of small seeds in its crop. Mr. N. Etheridge, of Colo Vale, informed me that the stomach of a bird he examined, procured in that locality, contained fifteen more or less perfect specimens of large green locusts. Boobook Owls used to be a great nuisance at the Australian Museum, Sydney, in 1887-8. Dr. E. P. Ramsay, the then Curator, and who used to reside on the premises, had an aviary on either side of the private entrance to the building facing William Street. Being interested at the time in the breeding of several species of rare Finches, obtained from Northern and North-western Australia, I used to examine the aviaries every morning. On several occasions Dr. Ramsay and I found therein one or more of the Finches dead on the floor, and minus one leg. At first we conjectured it was caused by rats, but as the floor was formed of paving stones, and the mesh of the wire very fine, we concluded that was impossible. Several times on moonlight nights the Finches were heard flying about as if much disturbed, and the next morning more dead birds would be found. At last we discovered one night a Boobook Owl, with noiseless flight, fluttering in front of one of the aviaries, and as the Finches flew about and finally settled on the wire, it quickly seized them by a leg and attempted to draw them through, which only resulted in the Finch's leg being torn off, and a mutilated or dead bird falling on to the floor of the aviary. So bold did the Owls become that one night, on

* Hist. Colls. Brit. Mus. Bds., p. 112 (1906)

hearing the birds fluttering, we went out and saw an Owl perched on some iron railings in front of the aviary, and it remained sitting there, whereupon Dr. Ramsay, seizing the nearest and handiest weapon, a long-shafted obsidian-headed spear, gave a thrust and nearly succeeded in killing it. Ultimately covers were made to enclose the aviaries and protect the birds at night.

That it does not confine itself to the pursuit and capture only of small prey may be learned from the following note received from Mr. A. M. N. Rose, of Campbelltown, New South Wales, who writes me as follows:—"My brother, Mr. Reuben Rose, of Boloco, Snowy River, sent me a specimen of a Boobook Owl (*Ninox boobook*), which I am forwarding on to you. It chased his tame Pigeons into their house, near midday on the 28th September, 1908, and succeeded in dispatching two Pigeons, one of which was found with its head eaten off. My brother made a figure of four box trap, and baiting it with one of the dead Pigeons, trapped it alive."

I first met with this species in my early collecting days, in the heavily timbered Strzelecki Ranges, South Gippsland, Victoria. Just about dusk a bird alighted on the end of a dead branch of a Gum tree, leaning over the poultry yard of a farm. The owner at once ran into the house, and procuring a gun promptly shot at the would be chicken destroyer. Although he brought the bird to the ground, it was only wounded, and instead of trying to make its escape came at him open mouthed, and savagely attacked its would be captor's boots. In the day time I have met with it in Tea-tree scrubs, one's attention usually being directed to it by the united cries of mobs of small birds. Ring-barked paddocks, among dense timber, are, however, its favourite haunts, situations favourable for it obtaining its food, although it may be found among the trees bordering the rivers which intersect the open plains in the inland portions of the States.

Mr. W. B. Barnard, of the Dawson River, Queensland, has sent me the following notes:—"While camping at dusk on the 7th of November, 1890, I observed a Crow fighting with an Owl (*Ninox boobook*) in a lofty Eucalyptus. Thinking there might be a nest in the tree I struck it with my tomahawk, and flushed another Owl of the same species out of one of the hollow limbs. The nesting place was about sixty feet from the ground, and after climbing to it, I had to make an opening in the limb to reach the eggs, which were three in number and in a very advanced stage of incubation. As I was engaged in travelling with cattle at the time, I had no opportunity of blowing them, but after the elapse of a week from taking them, three days of which they had been hidden under the ground, I was surprised to find that the young birds were alive in them, which will serve as an instance to show the equable temperature of both soil and climate in Central Queensland."

Mr. George Savidge sends me the following notes from Copmanhurst, on the Upper Clarence River, New South Wales:—"The Boobook Owl (*Ninox boobook*) is fairly common in all parts of the Clarence River District, and may be heard on the flats bordering the river, as well as on the edges of the dense scrubs farther inland. The nesting-place is not often found. I have only met with their eggs on two occasions; once I found a pair which were much incubated in November, and upon another occasion I found a set of three eggs during October. In the day time it passes most of its time in some hollow tree or spout, also in the crevices of rocks and in shady trees."

From Belltrees, Scone, New South Wales, Mr. H. L. White writes me as follows:—" *Ninox boobook* is fairly plentiful in the Upper Hunter District, but more often heard than seen, of course. It is still the popular belief that the *Podargus*, and not this bird, utters the well known cry of 'More Pork.' Occasionally the Boobook Owl appears in the garden here, just before dark, and busily employs itself in catching insects, mostly on the wing. For some years a pair of these birds lived close to the house, and became very tame, but unfortunately one day they were startled from their resting place in a dense bush, flew into a tree near the Pigeons, and were promptly shot in mistake for hawks."

Writing from Mossgiel, in Western New South Wales, in 1885, the late Mr. K. H. Bennett remarks:—" *Ninox boobook* is occasionally met with here, but is by no means numerous. During the day it secrets itself in some densely foliated tree, or overhanging bush. On several occasions, too, I have disturbed it from the deserted burrow of the Rabbit Rat (*Perameles lagotis*). Its prey consists of mice and large nocturnal insects. Of its nidification I know nothing."

Mr. G. A. Keartland writes me as follows from Melbourne, Victoria:—" I have observed the Boobook Owl (*Ninox boobook*) in nearly every part of Australia I have visited, but it appears to be most numerous in Victoria. Although nocturnal birds they can see well in broad daylight. Whilst collecting in the Dandenong Ranges, near Bayswater, I disturbed a Boobook Owl in one of the gullies, and, observing that it held something in one of its talons, I shot the bird and found that it was devouring a freshly killed Pilot-bird (*Pycnoptilus floccosus*), the remaining portion of which was quite warm and limp. The Boobook Owl lives principally on birds and mice. At Preston they are troublesome in disturbing the birds in my aviary at night. On going to see whether some stray cat was causing the birds to flutter, I have, on several occasions, found one of these Owls hanging on to the wire netting. In our *Pittosporum* trees, where a number of the acclimatised Sparrows, Starlings and Minalis roost, the Boobook Owl is a regular visitor, usually about 9 p.m., his presence being announced by the squealing of his victim."

Writing me on the Owls of the Casterton District, Victoria, Dr. Ernest D'Ombraïn remarks:—" *Ninox boobook* is very common, and is also frequently shot for being a 'night Hawk.' During 1904 Mr. W. McLennan found five of the nests of this bird: two had clutches of three eggs. One of these nests (containing three young birds) was in the same hollow as that occupied by a family of three young Kookaburras (*Dacelo gigas*), which were only three feet away. These Owls make charming pets, and have always been my favourite bird in captivity, their quaint movements, coupled with their really human faces and grave demeanour, make them most interesting. That they will keep a house clear of rats and mice I am positive, having known them do so."

Mr. Edwin Ashby writes me from Blackwood, South Australia, as follows:—"The Boobook Owl (*Ninox boobook*) is numerous everywhere I have been in South Australia. I procured specimens near Perth, Western Australia, in which many of the light-coloured blotches were absent and the barring almost imperceptible on the tail-feathers. A specimen I received from the goldfields, near Siberia Soak, was also very dark plumaged. It was sent to me as the bird that says 'more pork.' I have also shot a bird I believed was making that note at Mount Barker, South Australia, and it proved to be this species of Owl."

Mr. Malcolm Harrison writes me from Hobart, Tasmania:—"Although *Ninox boobook* has been recorded as a Tasmanian species, personally I have never seen this Owl, nor have I ever heard any authentic instance of its having been met with on the island."

For the purposes of breeding it usually resorts to a hole in a tree, depositing its eggs on the decaying wood or dust usually found in these cavities, the nesting-places varying in height from within hand's reach to sixty or seventy feet from the ground, although the eggs are generally deposited several feet away from the entrance. In and underneath the nesting-places are ejected pellets of fur, mixed with debris and the bones of various small mammals and birds.

The eggs are usually three in number for a sitting, rarely four, and occasionally only two. They are rounded-oval in form, white, slightly lustrous, comparatively smooth shelled, with the exception of in some specimens having a few limy excrescences, and are minutely pitted as if with the point of a pin, which is hardly visible without the aid of a lens; occasionally they are nest-stained by the decaying wood on which they are laid. A set of two taken by Messrs. A. and W. White, at Wilson's River, Kangaroo Island, South Australia, on the 3rd October, 1893, measure:—Length (A) 1.63 × 1.35 inches: (B) 1.57 × 1.33 inches. These eggs were slightly

incubated. Mr. W. White also sent me an egg of a set of two taken by him from a disused nest of a Crow, on Kangaroo Island, on the 13th October, 1895. It measures 1.67 × 1.4 inches. A set of three taken by Mr. H. G. Barnard, at Bimbi, Duaringa, Queensland, on the 11th October, 1908, measures:—Length (A) 1.61 × 1.38 inches; (B) 1.58 × 1.38 inches; (C) 1.58 × 1.34 inches.

September and the four following months constitutes the usual breeding season in Eastern Australia.

Ninox ocellata.

Ninox ocellata, Homb. et Jacq., Voy. Pôle Sud, Zool., Tom. III., p. 51 (1853).

FAWN-BELLIED OWL.

Ninox ocellata, Sharpe, Cat. Bds. Brit. Mus., Vol. II., p. 170 (1875); North and Keartland, Trans. Roy. Soc. South Austr., 1898, p. 128; Sharpe, Handl. Bds., Vol. II., p. 291 (1899).

ADULT MALE.—*Like the adult male of Ninox boobook in the disposition of its markings, but smaller, and of a pale brown strongly washed with ochraceous-fawn colour on the upper and under parts, particularly on the rump and upper tail-coverts, the head of a darker brown and almost uniform in colour, the blotches on the upper wing-coverts and the margins of the feathers on the breast and abdomen are of a duller white, the latter having a slight fulvous tinge on some specimens, and the under wing-coverts are entirely fawn colour. Total length 11.5 inches, wing 8.2, tail 5, bill 0.85, tarsus 1.6.*

ADULT FEMALE.—*Similar in plumage to the male, but slightly larger. Wing 8.8 inches.*

Distribution.—North-western Australia, Northern Territory of South Australia, North Queensland.

MM. Hombron and Jacquinot first figured the present species in the Atlas of the “Voyage au Pôle Sud,” but the habitat of the type was erroneously recorded as Chili. The late Dr. R. B. Sharpe, in the “Catalogue of Birds in the British Museum,” in writing of *Ninox ocellata*, remarks.—“I have examined the type in the Paris Museum, and am satisfied that it is Australian, and never came from ‘Chili.’” The late Mr. Alexander Morton procured an adult male and female at Port Essington, in the Northern Territory of South Australia, in January, 1879, the female of which is more freely marked with white on the wings and scapulars than in other specimens examined. In North-western Australia Mr. G. A. Keartland procured this species early in 1897, near the junction of the Fitzroy and Margaret Rivers, while with the Calvert Exploring Expedition, and Mr. Tom Carter has noted it as a rare winter visitor at Point Cloates, and in 1908 Mr. H. L. White forwarded me a specimen for examination, collected for him by Mr. F. Lawson Whitlock, on the Coogan River, in that year, and who was also successful in finding several of its nesting-places with eggs. In the Northern Territory of South Australia Dr. Ernst Hartert has also recorded it from several localities in “Novitates Zoologicae.”† and I have examined skins and eggs received from Mr. J. H. Niemann on the Daly River, while Messrs. H. C. Robinson and W. S. Laverock, in the Birds of North Queensland, published in “The Ibis,”‡ remark that the specimens collected by Mr. E. Olive at Cooktown, agree well with one collected by Mr. Everett in Savu.

Mr. G. A. Keartland writes me as follows from Melbourne, Victoria:—“During my stay near the junction of the Fitzroy and Margaret Rivers, North-western Australia, in January, 1897, I saw a pair of Fawn-bellied Owls (*Ninox ocellata*) perched on the branch of a tree a few feet above my head. They were about two feet apart, and compressed their feathers in such a manner as to make them look smaller than they really are. I shot one, and found the remains

* Cat. Bds. Brit. Mus., Vol. II., p. 170 (1875). † Nov. Zool., Vol. XII., p. 210 (1905). ‡ Ibis, 1900, p. 621.

of mice and grasshoppers in its stomach. The egg I send you for description was taken by Mr. E. J. Harris on the 11th November, 1901, and was the only one in the nesting place, which was in a large limb of a Eucalypt, about seventy five feet from the ground. It was lying on the dry rotten wood, and a few pellets of feathers and bones of small birds and mice."

The eggs are two or three in number for a sitting, rounded-oval in form, white, the shell being close-grained but minutely pitted and slightly lustrous. A set of two taken by Mr. J. H. Niemann, on the 21st September, 1902, on the Daly River, in the Northern Territory of South Australia, measures:—Length (A) 1.75 × 1.33 inches; (B) 1.71 × 1.27 inches. Another set of two taken by him on the 22nd January, 1903, measures:—Length (A) 1.72 × 1.42 inches; (B) 1.68 × 1.45 inches. A set of three taken on the 18th September, 1908, on Kingfisher Creek, a tributary of the Coogan River, North-western Australia, measures:—Length (A) 1.67 × 1.4 inches; (B) 1.63 × 1.44 inches; (C) 1.63 × 1.41 inches. Another set of three in Mr. Thos. P. Austin's collection, taken in the same locality, on the 10th September, 1908, measures:—Length (A) 1.57 × 1.42 inches; (B) 1.53 × 1.4 inches; (C) 1.67 × 1.4 inches.

September and the four following months constitute the usual breeding season in North-western Australia and the Northern Territory of South Australia.

Ninox maculata.

SPOTTED OWL.

Noctua maculata, Vig. and Horsf., Trans. Linn. Soc., Vol. XV., p. 189 (1827).

Athena maculata, Gould, Bds. Austr., fol. Vol. I., pl. 33 (1848).

Spiloglaux maculatus, Gould, Handbk. Bds. Austr., Vol. I., p. 76 (1865).

Ninox maculata, Sharpe, Cat. Bds. Brit. Mus., Vol. II., p. 174 (1875); *id.*, Handl. Bds., Vol. I., p. 291 (1899).

ADULT MALE.—*General colour above chocolate-brown with rounded white spots on the scapulars and greater wing-coverts, the head and hind-neck similarly marked, but the spots are much smaller and of a duller white: lesser and median upper wing-coverts like the back: quills brown, crossed with paler brown bars, and having a spot-like dull white mark about the middle of the outer web: tail brown with the remains of paler brown cross-bars, which are less distinct on the outer web of all but the central pair of feathers: forehead and feathers around the anterior portion of the eye whitish: lores whitish, blackish at the tips: feathers below the eye and the ear-coverts brown, the chocolate-brown feathers surrounding them finely spotted or streaked with white: chin whitish, remainder of the under surface chocolate-brown, lighter than the back, the feathers on the foreneck streaked with white, those of the breast and flanks with a white bar near their base and a large rounded white spot on either side near the tip, and giving these parts a distinctly spotted appearance: thighs and centre of lower abdomen tawny with an ochreous wash: under tail-coverts dull white, their apical portion with a pale brownish irregular-shaped shaft streak, widening out into a blotch near the tip: "bill bluish-black, paler on the culmen: feet dirty-white: claws dark horn colour: iris yellow" (Holden). Total length 12 inches, wing 8.1, tail 5, bill 0.8, tarsus 1.5.*

ADULT FEMALE.—*Similar in plumage to the male, but slightly larger. Wing 8.65 inches.*

Distribution.—New South Wales, Victoria, South Australia, Tasmania, larger islands of Bass Strait.

IN general appearance the Spotted Owl resembles a smaller form of the Boobook Owl, but from which it may be chiefly distinguished by its lesser size: the chocolate-brown hue of the greater portion of the upper surface, and the more conspicuously rounded white markings of

the breast and flanks. The type of the present species was originally described by Messrs. Vigors and Horsfield in the "Transactions of the Linnean Society,"* in 1827, but the locality where the specimen was obtained is not recorded. It may have been procured by Mr. Caley, in the neighbourhood of Parramatta, near Sydney, who formed the greater part of the collection in the Linnean Society, and to whom Messrs. Vigors and Horsfield refer as follows:—"We are indebted for much of this valuable information to Mr. Caley, who collected the greater part of the New Holland birds belonging to the Society, and who kindly allowed us to make use of his original notes on these birds made during his residence in the colony. We have also to express a similar acknowledgment to Mr. Brown, who in his general zeal for science did not neglect the interests of zoology while devoting himself to the advancement of his favourite study." Although this species has been recorded as occurring in Southern Queensland and New South Wales, I have never met with it in a state of nature in any part of either State. That it must be extremely rare in New South Wales is evidenced by the fact that no specimen of it has been received by the Trustees of the Australian Museum during the period of twenty-five years I have been connected with the Institution. Of three localised Australian specimens in the collection, one presented by Col. Dr. R. E. Roth was caught off Gabo Island, Victoria, in April, 1885, presumably on ship-board; another was received from Mr. Hinder, of Petersham, in 1878, and a third presented by M. Leon Jaubert was procured by him at North Shore, in October, 1886; both of the latter localities are suburbs of Sydney. From Tasmania there are specimens collected by Mr. K. Broadbent in the Dogwood Gullies, near Launceston, in 1878. Mr. G. A. Keartland informs me that although he shot one of these birds in the Dandenong Ranges, Victoria, it can usually see sufficiently well in bright sunlight to give a wide berth to anyone approaching it, and that he has met with it during the Field Naturalists Club of Victoria's outings on some of the larger islands of Bass Strait.

While resident at Circular Head, on the north-west coast of Tasmania, Dr. Lonsdale Holden wrote as follows:—"In June, 1886, some children brought me a live *Ninox maculata*. It had been knocked down by a carter with his whip, in thick scrub on Circular Head Peninsula. In the following month I saw one in dense scrub at Circular Head; it took only short flights, from bush to bush, when disturbed, and I chased it for some time, always re-discovering it by the cries of some small birds, which were mobbing it. In August, 1886, a much mutilated specimen was brought me by children, and in the following month I saw another bird of this species among close and lofty Tea-tree, on a hill side near Sister's Creek. It was dazed by the light, and allowed of close observation and approach. When at last I put it to flight it flew almost into the beard of my companion, a black bush that would attract any Owl. On the 22nd April, 1887, I caught one that flew into a room at Montagu, in the early morning. It was 'hawking' for food in the morning twilight in the verandah, and flew in by the door, which I left open on leaving the house. On the 11th September, 1887, I saw one in the Tea-tree scrub of Half Moon Bay fly into an old opossum's nest, in which was a skull of a rodent and other debris, like the remains of an Owl nursery. Two days later I observed one in Tea-tree, near a water-hole, and watched it with a field-glass at close quarters. The white half moon above each eye is very conspicuous, and contrasts with the pure brown of the orbit. It was asleep in a rather scantily foliaged tree, with the bright sun shining on it. On the 29th July, 1888, I flushed two from a cave on the western side of Sister's Beach."

While resident at Bellerive, near Hobart, in South-eastern Tasmania, Dr. Holden wrote:—"Two young Spotted Owls were brought to me by a boy on the 13th December, 1897. They were just getting their wing feathers, which were about half grown. The boy said the nesting-place was in a hole of a dead tree, about twelve feet from the ground, near his home, and the tree was cut down to get the young ones. On the 12th February, 1905, I saw three young birds

* Trans. Linn. Soc. N. S. Wales, Vol. XV, p. 176 (1827).

in the She-oaks, through which the road runs eastwards, beyond Rokeby. I saw them as I drove by, and tried to catch them, but they were too strong on the wing."

Mr. Malcolm Harrison sends me the following notes from Hobart, Tasmania:—"The Spotted Owl (*Ninox maculata*) is widely distributed throughout Tasmania, there being few parts in which its call may not be heard. The nesting place, however, is not by any means easily located, and the two almost round, pure white eggs are looked upon as somewhat of a rarity. On one occasion only have I seen a set of three, and this clutch was obtained for me by Mr. A. L. Morrisby, of Sandford, in November, 1899. These eggs, which are still in my cabinet, are much larger than any other specimens I have seen, and this fact, together with the unusual number, led me to believe that they might be those of *Ninox boobook*, and caused me to take a special trip to Sandford to convince myself. The bird proved to be an example of *Ninox maculata*, and was well known to Mr. Morrisby as living in the homestead barn during the winter. It had, moreover, an old wound on one of the eyes, which enabled him to identify it with the nesting bird. When living at Newtown, near Hobart, one of these birds took up its abode in a Cypress-tree, within a few feet of my front door, and remained there for several months quite undisturbed by passers by."

While in Tasmania I had an opportunity of examining the two sets of Spotted Owls eggs, referred to by Mr. Harrison, in his collection. A set of two taken by Mr. E. H. Morrisby, on the 8th November, 1897, from a nesting-place in the trunk of a White Gum-tree, about thirty feet from the ground, are a very rounded oval in form, dull white, the shell being comparatively close-grained, smooth and slightly lustrous, and having a few small limy excrescences. Length (A) 1.52 × 1.3 inches; (B) 1.51 × 1.33 inches. A set of three taken by Mr. A. L. Morrisby from the same pair of birds, on the 1st November, 1899, are larger and not so pronouncedly a rounded oval in form, and measures:—Length (A) 1.63 × 1.37 inches; (B) 1.65 × 1.37 inches; (C) 1.65 × 1.37 inches. While resident at Table Cape, on the North-western coast of Tasmania, Mr. E. D. Atkinson sent me an egg for examination, taken by Mr. Massey at Bridgewater, on the 7th October, 1886. It measured 1.58 × 1.37 inches.

From the preceding notes it will be seen that this species breeds much later than does *Ninox connivens*, October and the three following months apparently constituting the breeding season.

Ninox connivens.

WINKING OWL.

Falco connivens, Lath., Gen. Syn., Suppl. II., p. 53 (1802).

Athene connivens, Gould, Bds. Austr., fol. Vol., pl. 34 (1848).

Hieracoglauc connivens, Gould, Handbk. Bds. Austr., Vol. I., p. 71 (1865).

Ninox connivens, Sharpe, Cat. Bds. Brit. Mus., Vol. II., p. 175 (1875); *id.*, Hand-l. Bds., Vol. I., p. 291 (1899).

ADULT MALE.—*General colour above brown, with small rounded white spots on the hind-neck, the lesser upper wing-coverts similarly marked, and the median and upper greater wing-coverts and scapulars conspicuously blotched with white; quills brown, with broken paler brown cross-bars, which pass into white on the inner webs of the innermost secondaries; the outer webs of the primaries slightly notched with white, and some of the paler brown bars on the basal portion of the primaries freckled with darker brown; tail-feathers brown, barred across and tipped with whitish-brown; crown of the head and ear-coverts brown; forehead, base of the feathers around the eye and the chin white; lores white, their apical half black; all the under surface white, each feather with a broad longitudinal*

streak of brown down the middle; the under tail-coverts similar, but the markings of the longer feathers consist of two large brown blotches on the apical portion, and are connected with a narrow brown central streak; thighs and legs dull whitish, with a slight fulvous wash and longitudinally mottled with brown; bill and cere dull greenish-yellow, tip of the upper and under mandible bluish-black; feet dull yellow; claws black; iris yellow. Total length in the flesh 16 inches, wing 11.65, tail 7, bill 1.35, tarsus 1.75.

ADULT FEMALE.—Similar in plumage to the male, but larger. Wing 12.2 inches.

Distribution.—Queensland, New South Wales, Victoria, South Australia, Western Australia.

THE Winking Owl is widely distributed over the Australian continent, occurring in favourable situations nearly everywhere except Central Australia, North-western Australia, and the Cape York Peninsula, being replaced in the latter part by the closely allied species *Ninox peninsularis*, Salvadori. Although so generally dispersed, it is by no means as common as *Ninox boobook*, another species enjoying almost as wide a range. The specimens in the Australian Museum were chiefly obtained in Eastern New South Wales. I have also examined specimens from different parts of Western Australia, Victoria, Queensland, and as far north and west as Port Keats, in the Northern Territory of South Australia, and not far from the border line of North-western Australia. From this locality I expected to find *Ninox occidentalis*, or an intermediate form, instead of a typical *N. connivens*, and similar to examples obtained in New South Wales. An adult male obtained at Cooktown, Queensland, is slightly paler, and has a more pronounced white face than southern examples.

It is almost exclusively an inhabitant of the brushes of the coastal districts, the wooded ravines of contiguous mountain ranges, and the timbered districts of the adjacent open forest lands. In the inland portion of the States it usually frequents the large timber growing on the margins of rivers and creeks. Near Sydney it is a rare species, although the drawing which now constitutes the type was made from a specimen procured there in the early days of the settlement of Australia. While at Cobborah Station, Cobhora, about three hundred and thirty miles north-west of Sydney, Mr. Thos. P. Austin pointed out pairs of these birds in large Gum-trees growing on the banks of the Talbragar River, and from where Mr. Austin had on two occasions procured their eggs. The usual keen and bright lookout was kept by these birds, one pair of which we disturbed while watching them under the tree they were in, but they only took refuge in a densely-foliaged tree about one hundred yards away.

Stomachs examined contained the undigested portions of various large insects and small mammals and birds, with which were mixed fur, feathers and a little gravel and sand.

There is the usual amount of individual variation in the colour of specimens, even in the same State, some examples having the broad longitudinal streaks on the under surface dark slaty-brown, and having a dusky wash to the feathers of the upper parts.

Of the many vernacular names bestowed on the different members of the genus *Ninox*, including those of "Boobook" and "Morepork," no one is more fittingly appropriate to all sections of this subdivision than that of "Hawk Owl" for while the former two closely resemble the sound of note at least of *N. boobook* and its allies, the latter indicates the keen eye and active alertness of all members of the genus, in contradistinction to the different species of the genus *Strix*, with their pronounced facial disk and apparent general look of drowsiness and stupidity. Where, too, there is a variety of local and vernacular names, it leads to confusion. In Tasmania the name of "More Pork" is there commonly applied to *Podargus curvirostris* (= *P. strigoides*), but in New Zealand the same name is used to distinguish *Ninox nova-zealandiæ*.

In "The History of the Collections in the British Museum," the volume devoted to birds, so full of interest to Australian Ornithologists as regards the early nomenclature of many species, Dr. R. B. Sharpe remarks that Latham's description of the Winking Falcon, in his "General

Synopsis of Birds," and of *Falco comivens*, in his "Index Ornithologicus,"[†] are founded on a picture of Watling's now in the British Museum, and this is therefore the type of *Ninox comivens*. On the preceding but one page † Dr. Sharpe, referring to this volume of paintings, writes:—"These drawings had evidently been shown to Latham, who named most of the birds, and seems to have referred to these pictures as 'Mr. Lambert's Drawings.' They do not seem, however, to have been Lambert's property at any time. The type of Latham's species are, in fact, founded on these drawings of Watling." We have proof, however, that Lambert had at one time in his possession either this volume or a duplicate one, for Gould, in writing of *Ninox comivens* in his "Handbook to the Birds of Australia,"[‡] remarks:—"It will be seen on reference to the synonyms, that I described this bird in the 'Proceedings of the Zoological Society' under the specific name of *fortis*; but I have since ascertained through the kindness of the late Earl of Derby, in affording me the use and inspection of the three volumes of drawings of Australian Birds, formerly in the possession of the late A. B. Lambert, Esq., that it is identical with the Winking Owl of Latham; any seeming inattention on my part in describing an apparently new Owl, without consulting that author, will, I hope, be readily excused, as few ornithologists would think of looking for the description of this bird under the genus *Falco*."

"It is due to the acumen of the late Mr. Strickland that, by means of the drawings above alluded to, the present and other species described by Latham have been identified. . . .; unfortunately I did not obtain the loan of these drawings until my work was far advanced, otherwise the errors I now correct would not have occurred."

Mr. W. B. Barnard, writing from Coomooboolaroo, Duaringa, Queensland, on the 10th March, 1891, remarks:—"With regard to the Winking Owl (*Ninox comivens*) we did find a nest once with young ones about half grown; the old birds became savage, and kept flying at my brother, who was up the tree, but never struck him. The nesting place was about eighteen inches down a hole in a big Gum-tree; this tree was blown down by the terrific cyclone that visited us last year. What became of the old birds I do not know, but probably they were killed by the hail, which destroyed so many birds in this district at that time."

Mr. H. G. Barnard sends me the following notes from Bimbi, Duaringa, Queensland:—"During 1906 I took three sets of *Ninox comivens* eggs, but there were only two eggs in each set. Again in 1907 I took three sets, one of which contained three eggs, the others two each. In 1908 I only took one set, which contained three eggs. The eggs are deposited on the soft dirt at the bottom of a hollow in a tree, the depth of the holes varying from one foot to three feet. While the female is sitting the male resides in the branches of a tree close to the one which contains the nest: upon an intruder approaching the spot he utters a loud muttered growl, thus drawing ones attention to him. On looking around a tree may be observed with a hollow spout, and upon hitting the butt with a stick or the back of a tomahawk, the other bird will leave the hole, thus shewing the whereabouts of the nesting-place. The food of these Owls consists of small animals, such as Flying Squirrels, Brush-tailed Rats, etc., and birds. My brother, Mr. C. A. Barnard, lately saw one with the half-eaten body of a *Podargus strigoides*. The breeding months are September and October."

Writing me from Cullenbone, Mudgee, New South Wales, on the 22nd May, 1907, the late Mr. J. C. Cox remarked:—"A strange night bird has made an appearance in this neighbourhood for about a couple of months, and its cries have puzzled those who have heard it. It was thought at first to be a fox barking. The cry is very like a dog barking, so much so that it starts the dogs. It is not the bark of a common dog, but more like that of a Newfoundland or St. Bernard. The bird repeats it twice at intervals in a bass tone, 'ouf, ouf.' When the birds are in pairs

[†] Gen. Syn., Suppl. II., p. 53. † Ind. Orn., Suppl., p. XII. † Hist. Coll. Brit. Mus. Bds., p. 108.

§ Handbk. Bds. Austr., Vol. I., p. 72 (1845).

the cry of each is dissimilar, probably being male and female. Sounds travel a long way on a calm night, and the cry of this bird is heard nearly half a mile away. Three men here went to look for the cause of the noise, and found it came from a tree top. Firing into the tree two large birds flew out, but it was too dark to make a successful shot or see the birds distinctly. It is an Owl I should think, but what species? There are several of the large Owls at Mount Wilson, but I never heard a cry similar to this one, and I have never heard it here before, nor has any one else so far as I can learn."

On the following day Mr. Cox wrote:—"I have secured the 'Barking Owl,' and it turns out to be *Hieracoglaux connivens*, and I am sending it to you. There was nothing in its stomach except caterpillars and mantis, but there was rabbit's fur on its talons."

The late Mr. K. H. Bennett wrote me as follows in 1886:—" *Ninox connivens* was formerly rather plentiful along the banks of the Lachlan and Murrumbidgee Rivers, frequenting the dense clumps of Acacias fringing the banks, and just about sundown, and before leaving its retreat, its deep sepulchral 'hoot, hoot,' uttered at intervals of a few minutes, would often be heard. Usually it was met with in pairs, and was exclusively confined to the vicinity of the river banks, never being found in the timbered back country or out on the plains. I have not seen anything of this species for many years."

From Cobborah Station, Cobbara, New South Wales, Mr. Thos. Austin writes me:—"The Winking Owl (*Ninox connivens*), as far as I can tell, is not a common bird in this district, but during the past week (September 24th, 1908) I have examined three of their nesting places, and I would probably not have found these had I not seen the young birds of last season in the tree close to where their nests were; this was during December, 1907. Two of the nesting places examined contained young, the first nest two, about a fortnight old, the second nest one young bird about half fledged. These young birds were exceedingly fat, and although the latter one could not have been more than three weeks old, it appeared to be much larger than an adult bird. When I went to look for the third nest I was again just too late for eggs. Much to my surprise I saw the two old birds perched together in a tree; knowing that they usually live in holes I thought there must be something wrong, and commenced to hunt about for their nesting hole. I had not far to look, for only a few yards behind me I saw a large dead tree which had just been burned down by charcoal burners; upon looking into a hole imagine my disappointment to see two broken eggs, which were quite fresh. The poor birds seemed to be quite lost, and did not know where to go. From the appearance of the nesting holes with young, these birds feed mostly upon young rabbits, Red-rumped Parrakeets and large beetles. The young birds were resting upon a heap of filth, the odour of which was most objectionable. The female (I presume it was) remained in the nest all day with her young, and when she was forced to fly away the young commenced a most peculiar chattering, which I could hear when only about half way up to the nest, so knew I was too late for eggs before I looked into the nesting hole. These birds are evidently early breeders, and possibly rear two broods in a season."

Writing later Mr. Austin remarks:—"On the 9th October, 1908, I found a nest of *Ninox connivens* with three eggs, and to get them I had to crawl over a hole in which a swarm of bees had their nest. It was in a very large Red Gum-tree on the bank of the Talbragar River."

Under date 15th August, 1909, Mr. Austin writes:—"By to-day's post I am sending you three young *Ninox connivens*, and as you will see they are not many days old. I took them from the same nest as where I saw the young one last season. I have been carefully (as I thought) watching this nest, in hopes of getting another set of these eggs, but as the nesting hollow is at the top of a very large Red Gum-tree, and very difficult to climb to, I have been visiting the tree once a week lately, and throwing sticks up it, expecting to flush the bird if sitting, the same as I did last year. Yesterday I threw up a stick again, but could not flush the bird, so started

to climb up and see if she had laid. When I was about half way up out flew an Owl, so of course I thought I was sure of getting a set of eggs, and imagine my disappointment when I saw the young ones. In the nest was the hind half of a young rabbit. Before climbing this tree I had visited the other nesting tree I knew of, the one where I took my set of three eggs last year, and was fortunate enough to flush this bird by throwing sticks; the result was another set of three eggs almost fresh. I did not see the bird fly from the hollow; she must have done so after I had thrown a few sticks and then walked away a few yards to get some more; while I was gathering these I heard a peculiar noise, which appeared to come from the opposite bank of the river. I turned round, thinking it was a small dog, as the noise resembled a half bark, half growl, such as a small dog utters when very frightened. I could see nothing and hear nothing, so thought I must have been mistaken. I threw another stick, then I heard the same peculiar noise again. I then knew it must be the Owl; just then two *Ptilotis penicillata* arrived, and in their usual manner soon showed me the Owl. When nearly up to the nesting hole one of the birds came and perched upon a branch within forty feet of me, and started the peculiar growling noise again, which slowly changed into the well known call note of "Boobook, mopoke," uttered about half a dozen times, at intervals of a few seconds, and in a very low tone. I just kept quiet and watched her for a few minutes, when she flew into a neighbouring tree. While I was sitting under the tree blowing the eggs, the other Owl arrived, and the two of them sat together and held forth the note 'mopoke, mopoke, mopoke,' about twenty times very quickly and loudly, such as I have never heard it before. It sounded so strange to hear the well known note in broad daylight. You will see from these notes that it is not only the Boobook Owl that has the 'mopoke' call."

During a visit to Cobborah Station, Mr. Austin climbed on the 12th October, 1909, to a nesting place of a pair of these birds in a large Red Gum-tree, on the bank of the Talbragar River, and from which he had previously taken two sets of three eggs, and found two young birds. The nesting-place was fully seventy feet from the ground, and the place where the eggs were deposited about two feet six inches from the entrance, and which he informed me contained the usual mass of fur, bones, &c. The pair of Owls were seen sitting in the next tree.

Mr. G. A. Keartland, of Melbourne, Victoria, has sent me the following note:—"Winking Owls (*Ninox connivens*) are sometimes seen in the vicinity of Melton, Victoria, where they pass the day in the crevices between the rocks, or in the thick foliage of the bushes on the margin of the creeks. Twice I disturbed them from rabbit burrows in the bank of the river, when using ferrets for rabbits. Mr. Alex. M'Innes dislodged one from between two rocks on the Werribee River, and on examining the spot the bird had just left, discovered a fresh egg lying on a few dry gum leaves. Another friend, Mr. Percy Bond, informed me he found an egg of this bird in a rabbit burrow, about eighteen inches from the entrance, from which his ferret had just driven the Owl, which was shot."

Dr. Ernest D'Ombraïn writing me on the Owls of the Casterton District, Victoria, remarks:—" *Ninox connivens* is quite plentiful here, but I regret I cannot tell you much of its habits in the wild state. It is often caught in the rabbit traps by the legs, and on two occasions I have had live examples so taken. The killing and destruction of rabbits by poison, and so of many birds, is thus responsible for the destruction of vermin killers, and in the shape of Owls by traps also. The legs are very stout and strong, also the talons. The eyes are large, and have splendid bright yellow irides. There is a constantly repeated wink, hence the name. I am quite positive that this Owl utters the cry of 'boo-book,' for my specimen used to call thus, and I frequently assured myself of the fact."

The eggs are usually three in number for a sitting, but sometimes only two are laid. They are of a rounded-oval in form, pure white, and rather coarse-grained; this roughness, however, is usually due to numerous small rounded and short linear limy excrescences, although

like the surface of the shell, they are generally lustrous. A set of two in the Australian Museum Collection, taken by Mr. H. G. Barnard, at Bimbi, Duaringa, Queensland, on the 5th November, 1905, measures:—Length (A) 1.84 × 1.56 inches; (B) 1.88 × 1.57 inches. A set of three taken by Mr. Barnard, in the same locality, on the 1st October, 1908, measures:—Length (A) 1.82 × 1.57 inches; (B) 1.78 × 1.52 inches; (C) 1.77 × 1.47 inches. A set in Mr. Thos. P. Austin's Collection, taken by him on Cobborah Station, Cobborah, New South Wales, on the 9th October, 1908, measures:—Length (A) 1.83 × 1.53 inches; (B) 1.81 × 1.51 inches; (C) 1.86 × 1.53 inches.

The young, when about a week old, have the eyes unopened, and are clothed in pure white down; bill dull leaden blue-black, fleshy-white at the base; feet pale yellow, claws black.

September and October constitutes the usual breeding season in Eastern Australia, but that it must be sometimes of longer duration is proved by Mr. Thos. P. Austin finding recently hatched young on the 25th August, 1909, the eggs probably being deposited in the first week in August.

Ninox peninsularis.

NORTHERN WINKING OWL.

Ninox peninsularis, Salvad., Ann. Mus. Civ. Gen., Vol. VII. (1st Ser.), p. 992 (1875); Sharpe, Voy. H.M.S. Alert, p. 11 (1884).

ADULT MALE.—*Like the adult male of Ninox connivens*, Latham, but smaller, the central streaks to the feathers of the forewing more rufous-brown and not so well defined, while those on the breast and abdomen have the former character even more accentuated: "bill greenish-yellow; feet yellow; iris yellow" (McLennan). Total length 13.1 inches, wing 10.5, tail 5.7, bill 1.15, tarsus 1.45.

Distribution.—Cape York Peninsula, Northern Queensland.

FOR an opportunity of describing this smaller northern form, also its eggs, I am indebted to Dr. W. Macgillivray, of Broken Hill, South-western New South Wales, who kindly sent me for examination a skin of an adult male and a set of eggs collected for him by Mr. W. McLennan, at Paira, Cape York Peninsula, Northern Queensland. Although specimens from New South Wales have the streaks as a rule typically darker, others closely approach in colour the northern form, differing only from it by the larger size. I do not consider *Ninox peninsularis* so worthy of separation from *N. connivens*, as I do the North-western Australian form, *N. occidentalis*.

Relative to finding the nesting places of the Northern Winking Owl, I have extracted the following information from Mr. W. McLennan's notes, made while on Cape York Peninsula:— "On the 6th August, 1911, about four miles from Paira, I flushed *Ninox peninsularis* from the branches of a Moreton Bay Ash, and flushed another from a hollow in a tree close by. The nesting place, which contained two eggs, was in a Moreton Bay Ash, forty feet from the ground, and was eighteen inches in diameter and three feet in depth. The bird that I flushed from the nest appeared to be the smaller of the two, and was probably the male. Five days later, in a large pocket on Watadinia Creek, I flushed another Owl of the same species from the branches of a Bloodwood, and its mate from a hollow in a big Tea-tree a few yards away. A Sulphur-crested Cockatoo flew from another hollow in the same tree. The Owl's nesting place, which contained two fresh eggs, was forty feet from the ground, and was a foot in diameter by two feet six inches in length. On the 26th August, 1911, while returning from Peak Point on my way home, I flushed *Ninox peninsularis* from the branches of a Tea-tree, and its mate from a hollow in the same tree. The nesting-place, which contained two eggs, was sixty feet from the ground, in a hollow two feet deep, and the entrance to it eight inches in diameter; the bottom of the

cavity was covered with finely chipped rotten wood. Both birds were very excited, calling to each other the whole time I was climbing to the nest. On the 30th August I flushed another of these Owls in a dead Tea-tree, and its mate from a hollow in another Tea-tree. The nesting place was thirty feet from the ground, the entrance in a horizontal limb, and contained two hard set eggs on a bed of finely chipped rotten wood. I went on to where I had previously noted a pair of these Owls on the 17th August, and flushed one from the branches and the other from a hollow in a Tea-tree sixty feet from the ground. The tree was a difficult one to climb, and the hollow in an awkward position to get at, and contained two eggs, but unfortunately I broke them. I had just hold of the eggs when I felt myself slipping, and had to drop them and catch hold of the tree. On the same day I flushed another of these Owls from a nesting place in a dead Tea-tree. The hollow was twenty-five feet from the ground, three feet in depth, and fourteen inches across the entrance, the eggs two in number, being placed in a freshly built nest of the Great Palm Cockatoo (*Microglossus aterrimus*). On the 1st September, at Paira, I found a nesting place in a Tea-tree fifty feet from the ground, the bottom of the cavity, which was two feet deep, was covered with finely chipped wood, on which the eggs were laid."

The eggs are two in number for a sitting, varying from swollen oval to almost globular in form, pure white, the shell being fine-grained and almost lustreless. A set of two taken by Mr. W. McLennan at Cape York, Northern Queensland, measures:—Length (A) 1.95 × 1.45 inches; (B) 1.81 × 1.48 inches.

Eggs were obtained in August and September.

Ninox occidentalis.

WESTERN WINKING OWL.

Ninox connivens-occidentalis, Ramsay, Proc. Linn. Soc. N. S. Wales, Vol. I., 2nd ser., p. 1086 (1886).

Ninox occidentalis, North and Keartland, Trans. Roy. Soc. South Austr., 1889, p. 129; Sharpe, Hand-l. Bds., Vol. I., p. 291 (1899).

ADULT MALE.—Like the adult male of *NINOX CONNIVENS*, but slightly smaller, the upper parts of a paler and clearer brown, as is also the crown of the head; there is a large extent of white on the forehead feathers beneath the eyes and the ear-coverts; the feathers of the entire under surface streaked with pale rufous-brown, and the thighs fulvous, passing into fulvous-white on the feet, and sparingly flecked with brown. Total length of skin 14.5 inches, wing 11, tail 6.8, bill 1.1, tarsus 1.8.

ADULT FEMALE.—Similar in plumage to the male, but slightly larger. Wing 12 inches.

Distribution.—North-western Australia, Northern Territory of South Australia.

THE present species, described by Dr. E. P. Ramsay in the "Proceedings of the Linnean Society of New South Wales" under the name of *Ninox connivens-occidentalis*, was discovered by Mr. E. J. Cairn near the Kimberley District, inland from Derby, North-western Australia, in 1886, and may be distinguished chiefly by the pale rufous-brown stripe down the centre of each feather of the under surface. Subsequently Mr. G. H. Keartland, while with the Calvert Exploring Expedition in 1897, obtained specimens near the junction of the Fitzroy and Margaret Rivers, and more recently Dr. Ernst Hartert, in "Novitates Zoologicae," † records it from Yeeda Creek, in the West Kimberley District, also Margaret Crossing, South Alligator and the Mary Rivers in the Northern Territory of South Australia.

Ninox connivens and *N. boobook* are each represented in the north-eastern and north-western portions of the Continent by closely allied species. The former respectively by *N. peninsulae* and *N. occidentalis*, and the latter by *N. lurida* and *N. ocellata*.

* Proc. Linn. Soc. N. S. Wales, Vol. I., 2nd Ser., p. 1086 (1886). † Nov. Zool., Vol. XII, p. 209 (1905).

According to the following note there appears to be nothing in its habits and food to distinguish it from the better known *Ninox connexus* of Eastern and Southern Australia.

Mr. G. A. Keartland writes me as follows from Melbourne, Victoria:—"The Western Winking Owl (*Ninox occidentalis*) is usually seen in pairs in the bushes or thick scrub on the margin of the rivers and streams of North-western Australia. Although nocturnal birds they appear to see well in the brightest sunlight. I shot one of a pair near the Fitzroy River, and had to chase its mate from tree to tree for some time before securing it. It appeared to see me quite well enough to make its escape before I got within shooting distance, and was only secured by strategy. They feed on small animals, birds, lizards, insects and frogs. I never heard them utter a note of any kind."

A set of two eggs taken on the 24th September, 1902, in the Northern Territory of South Australia, are a rounded oval in form, pure white, the shell, although comparatively smooth and having here and there a few limy excrescences, being slightly lustrous, and indistinguishable from the eggs of *Ninox connexus*. Length (A) 1.81 × 1.57 inches; (B) 1.71 × 1.57 inches. A skin of the parent accompanied these eggs.

Family STRIGIDÆ.

Genus STRIX, *Linnaeus*.

Strix delicatula.

DELICATE OWL.

Strix delicatulus, Gould, Proc. Zool. Soc., 1836, p. 140; *id.*, Bds. Austr., fol. Vol. I., pl. 31 (1848);
id., Gould, Handbk. Bds. Austr., Vol. I., p. 66 (1865).

Strix delicatula, Sharpe, Cat. Bds. Brit. Mus., Vol. II., p. 297 (1875); *id.*, Hand-l. Bds., Vol. I.,
p. 301 (1899).

ADULT MALE.—*General colour above light ashy-grey with numerous faint zig-zag lines, varying from greyish-brown on the body to a clearer brown or dark brown on the wings and scapulars, the basal portion of most of the feathers pale buff, passing into light orange-buff on the scapulars and upper wing-coverts, and having a narrow blackish mesial streak near the tip, enclosing a central streak of white, these markings being less distinct on the crown, nape and hind neck; quills more distinctly marked with zig-zag lines, and having the remains of a few dark brown cross-bars, all of them more or less washed with orange buff, in some specimens the latter is the predominant colour of the quills; margins of their inner webs white, increasing in extent towards the outer secondaries; edge of the wing pure white; tail-feathers vary from pale to rich buff, with brownish cross-bars, the interspaces more or less freckled with brown, the apical portion dull whitish freckled with greyish-brown, the inner webs of all but the central pair margined with white, the outermost on either side, except the brown cross-bars, almost pure white on both webs; facial disc white, surrounded by a ruff of white feathers, their exposed tips being creamy buff below and rich rufous-buff above, and all more or less tipped or edged with black; a patch of feathers in front of the eye dusky-rufous; all the under surface and under wing-coverts pure white, most of the feathers more or less flecked with blackish-brown near the tip; under tail-coverts pure white; basal portion of bill very pale bluish colour, the apical portion whitish-horn colour; feet yellowish-white; iris black. Total length in the flesh 12.5 inches, wing 10.75 tail 5, exposed portion of bill 0.8, tarsus 2.35.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Southern New Guinea.

OMITTING Central Australia, where it is rare, the Delicate Owl is generally distributed in favourable situations over the greater portion of the Australian Continent, and is likewise found in the southern portion of New Guinea. No more chastely plumaged bird could be found in the Australian avifauna, although it is subject to much individual variation. Typically the plumage is as described above, but some specimens are of a deeper orange-buff on the upper parts, which extends, but to a far less degree, to the under parts, and more particularly the chest and upper portion of the breast. Others have the apical portion of the white feathers of the under surface finely flecked, spotted or streaked with blackish-brown, while some have the feathers of the chest and breast pure silky white, and entirely devoid of markings. The different species of the genus *Strix* may be chiefly distinguished by their pronounced facial disc, which is also found, but to a less extent, in the Harriers of the Order ACCIPITRES, and by their long wings, which extend beyond the end of the comparatively short tail.

In New South Wales it inhabits alike the brushes of coastal districts, the contiguous mountain ranges, and open forest lands, and the dry and arid scrub lands of the Western District, provided there are plenty of holes in hollow timber sufficiently large enough for it to roost in during the day, or to use as a nesting place. It also frequents wool sheds, lofts, stables and other out-buildings suitable as a resting place during the day and to shelter it from the sun's rays.

It is chiefly a nocturnal species, coming out to feed when most other birds are going to roost, and preying upon rats, mice, bats, small birds and insects. If disturbed during the day time, as it may be sometimes from its leafy canopy in some thick bush, its presence is soon made known, for it is generally mobbed by all the small birds in the neighbourhood. Although the Delicate Owl is remarkable for the cleanliness and purity of its unsullied plumage, it appears strange that the young ones should usually be surrounded with a mass of filth, consisting chiefly of ejected pellets of fur and feathers, or portions of dead animals brought for them as food. To see this bird to advantage one must look for it about dusk, although one may meet with it late at night, or at any time between sunset and sunrise. A snap-shot photograph of a Delicate Owl, full front, on the wing, sent me in September, 1902, by Dr. Ernest D'Ombraïn, while resident at Casterton, Victoria, well represents a living bird he had, but which sulked and died in about ten days. The pronounced facial disc and well defined eyes, rendered more conspicuous by the dusky rufous spot in front of the latter, wide-spread wings and tail-feathers, and fore-shortened body, gives it almost a supernatural appearance, reminding one slightly of the standard representation given of a cherub. There is a beautiful mounted specimen in the Australian Museum Collection, in perfect plumage, with outspread wings, presented by Mr. C. H. Fitzhardinge, and obtained by him at Dubbo, New South Wales. Of the remaining specimens in the collection, it is noteworthy that although several were obtained close to Sydney, the birds generally are as common in the mountain ranges and on the plains beyond.

It utters a screeching note, the sound of which it would be difficult to convey any idea of by words or syllables. Stomachs of these birds examined, obtained in the flesh from different parts of New South Wales, contained the remains of small mammals, principally field mice, bats, rats and also small birds and insects, generally beetles. The ejected fur pellets prove, however, that it subsists almost entirely on rats and mice. It is an extremely useful bird, and in common with all the species of Owls is, in New South Wales, included in the schedule of the "Birds Protection Act."

Mr. George Savidge sends me the following notes from Copmanhurst, on the Upper Clarence River :—"The Delicate Owl (*Strix delicatula*) is fairly plentifully dispersed on the flats and maize fields of the Clarence River, and its screech may often be heard at night time. It passes the day in a hollow tree or some thick shady bush; one roosted off and on for several months in a Mulberry-tree near my house at Copmanhurst. The only nesting-place I have

found was during September, and was situated in a dead Grey Gum. The birds gained access to the inside of the tree through a small crack where one could hardly get a hand through. The nesting-places contained two young ones, which were resting on a mass of ejected pellets, dead birds, etc., one examined being a half devoured Quail. A strong and disagreeable odour was emitted by the nesting place, and the blow-flies must have been a torment to the young ones. The latter were very wild, and showed fight at once. These birds prey upon mice about my buildings in the winter months, and their screech disturbed my neighbour so much that I had difficulty in persuading him not to shoot the birds, hoping to get their eggs, but as the breeding time came round, about September, they disappeared to more secluded spots. They are back again now (May)."



DELICATE OWL, NESTLING.

Writing under date 26th September, 1901, Mr. Savidge remarks: "With the accompanying photograph I send you a nestling Delicate Owl. I was disappointed when I saw young in the nesting place, for I hoped to get a set of eggs. The bird does not hoot, as has been stated, but makes a noise like an opossum, without the break that is in the latter. This bird must have laid its eggs about the end of August."

Mr. Henry L. White, of Belltrees, Scone, New South Wales, sends me the following notes:—"I have frequently noted *Strix delicatula* here, and have at times flushed it from the dense *Casuarina* trees growing along the streams. A fine bird was secured alive in a

boundary rider's house, into which it found its way *via* the chimney. Occasionally the Delicate Owl may be seen in the woolshed here."

Mr. Thos. P. Austin, of Cobborah Station, Cobborah, New South Wales, writes:—"Several times within the last three years I have found dead Delicate Owls (*Strix delicatula*) on top of the hay in my hayshed, and they evidently come there at night to catch mice. One of these dead birds was not more than a few months old, so I knew they must breed somewhere in the district, but had never seen a living bird here until about the end of 1909, when, rabbit shooting late one evening, I flushed one from a very large Red Gum-tree on the bank of the Talbragar River. On the 29th September, 1910, I took a rope ladder to examine the tree, and while getting the ladder up the tree flushed the Owl, and found three fresh eggs in a very large hollow. The eggs I had to scoop, as they were four feet from the entrance. In the same tree there was also the nesting hollow of *Ninox connivens* with three young, *Anas superciliosa* with eight eggs, *Dacelo gigas* with three eggs, and numerous nests of *Platycecus eximius* and *Psephotus haematonotus*. In the same hollow with the Black Duck's eggs, I took two young *Cacatua galerita* a few years ago. I have also known *Eurystomus australis* to breed in this tree. Upon the same branch as the nesting hollow of *Strix delicatula*, only a few feet further out, a swarm of bees had their hive, and now a young swarm have taken up their abode in the nesting hollow used by *Strix delicatula*, but the Owl still lives in the same tree in another hollow."

The late Mr. K. H. Bennett wrote in 1886 from Mossgiel, Western New South Wales:—" *Strix delicatula* was very numerous here at the time of the rat invasion, in the early days of settlement, and disappeared after the rats left the district. During that time I found it breeding on two occasions, the eggs, six in number, rather rounded in form and dull white, were in each instance simply deposited on the soft decayed wood in the hollow trunks of trees, in a similar manner to those of Parrakeets. I have occasionally seen individuals since, but they did not remain to breed, and like all the Owl family can only be regarded as occasional visitors."

With a specimen in the flesh presented to the Trustees of the Australian Museum by Miss Eunice Bond, of Stonington, Lockhart, New South Wales, in July, 1909, the following note was received:—"This Owl was sitting on the bough of a tree early in the afternoon, and about eight 'Jackasses' (*Dacelo gigas*) were laughing round it; it fell on the ground, and the 'Jackasses' kept swooping down and pecking it, and made it bleed at the beak, so we picked it up and brought it inside the house, but it died in a few minutes. These Owls are rare here, my father has only seen one once before."

Mr. G. A. Kearthland has kindly favoured me with the following notes from Melbourne, Victoria:—"The Delicate Owl (*Strix delicatula*) may be found in almost every part of Australia, but these birds are most numerous near rivers and creeks, where they breed in the hollow limbs of the large trees. At Werribee, Victoria, I found a pair nesting in a hollow *Casuarina*, no doubt owing to the absence of large timber. Mr. Jas. F. Field secured a clutch of their eggs near Alice Springs, whilst Mr. Alex. Ross forwarded me others from Crown Point, Central Australia. On the Daly River, in the Northern Territory of South Australia, and near the Fitzroy River, North-western Australia, they are very numerous, probably owing to the presence of large numbers of small marsupials, besides rats and mice. Whenever mice make their appearance in exceptionally large numbers in Victoria, the Delicate Owl seems to follow them, but when the mice disappear many of the Owls may be seen lying about dead and in a very lean condition, some little better than skeletons."

Dr. Ernest D'Ombraïn kindly sends me the following notes:—"In the Casterton District, Victoria, numbers of *Strix delicatula*, dying or dead, were found during the big drought time in the Mallee country. This is curious, for although the birds were emaciated both internally and externally, mice, etc., were plentiful in this district. I sent you a photograph of this species, and I enclose another of a pair of young in the down. This Owl makes a hissing sound, and like the Winking Owl uses the boles of trees and large branches with hollows in for a camping as well as nesting site. Into these hollows they return at dawn with a rabbit or other food, and will feed on it there in 'the dim-lit interior' during day time. The very young have eyes like a newly born puppy, inky in appearance, growing to a deeper black as they grow up. The birds snap loudly at one with their sharp hooked bills, and at the same time with ruffled feathers and wings raised, and all the time the head and face are kept moving in a circular manner. The average clutch of eggs is three, but Mr. W. McLennan on one occasion found one of five."

Mr. W. White, of the Reedbeds, South Australia, wrote me as follows under date 4th June, 1895:—"You will be pleased to hear that one of the large hollow logs I put up in a Gumtree on my son's property is now tenanted by *Strix delicatula*. The family STRIGIDÆ are very useful birds, well worth protecting and providing for, as is also *Dacelo gigas*. The hole the Owl occupies was last season used by *Dacelo gigas*, who brought out young. It is close to the back of the house, and has been occupied by the Owls for some months, and both they and the 'Jackasses' are there every evening, but I do not think the latter breed there now, as they have taken to another log I put up some hundred yards distant. If any one goes near the tree the Owl occupies, it makes straight for them. I have now got three *Strix delicatula* to come regularly twice a day for meat I place on a piece of board for them, close to the house. *Ninox boobook* also comes regularly for his supper in the shape of a piece of meat, a mouse, sparrow, part of a rat, or anything I may have, for he is not very particular provided it is fresh and not all fat."

For the purposes of breeding it resorts to a hole in a tree, the eggs being deposited on the decaying wood usually found in these cavities. Sometimes they are placed upon ejected pellets of fur, etc., or the latter may be placed around them.

The eggs are usually three or four in number for a sitting, but the late Mr. K. H. Bennett records finding six eggs in nests on two occasions. Typically they are a thick oval in form, dull white, the shell being rather coarse grained but lustrous.

An egg taken by Messrs. W. and A. White on the 1st December, 1883, from a hollow spout of a tree, at the Reedbeds, near Adelaide, South Australia, and which also contained three young birds, measures:—Length 1.6 × 1.28 inches. Another egg from a set of four taken by them from the same spout on the 30th September, 1884, measures:—Length 1.6 × 1.27 inches.

A nestling in the Australian Museum Collection, presented by Mr. George Savidge, and taken by him from a breeding place in a hole in a tree, on the 25th September, 1901, at Copmanhurst, on the Upper Clarence River, New South Wales, is covered with an admixture of long pure white down, and where the plumage is out of the sheaths it is precisely similar everywhere to that of the adult, except that the tail-feathers are white at the tips, and there is hardly any wash of buff on the exposed portion of them. Total length in the flesh 13 inches, wing 6.1, tail 3.1.

August and the four following months constitute the usual breeding season in Eastern Australia. At Point Cloates, North-western Australia, Mr. Tom Carter took incubated eggs on the 10th September, 1900.

Strix novæ-hollandiæ.

MASKED OWL.

Strix novæ-hollandiæ, Steph., Gen. Zool., Vol. XIII., pt. 2, p. 358; Gould, Handbk. Bds. Austr., Vol. I., p. 64 (1865); Sharpe, Cat. Bds. Brit. Mus., Vol. II., p. 303 (1875); *id.*, Handl. Bds., Vol. I., p. 301 (1899).

Strix personata, Gould, Bds. Austr., fol. Vol. I., pl. 29 (1848).

ADULT MALE.—*General colour above blackish-brown, each feather closely and finely freckled with white on the apical portion, and having a single white spot near the tip, their bases dull grey, and the central portion orange-buff, giving the upper parts, including the upper wing-coverts and scapulars a distinct mottled appearance: quills brown, passing into white on the margins of their inner webs, and barred across with darker brown, their outer webs and tips vermiculated with dull greyish-white or whity-brown, and having in the interspaces broken bar-like markings of pale orange-buff mottled with brown, which are richer in colour and more distinct on the outer primaries; tail-feathers white barred with dark brown, the interspaces mottled with dark brown and gradually becoming much paler and less in extent on the lateral feathers, which are almost pure white, except near the shaft: facial disc white, slightly stained with dull rufous around the eye, which has on the anterior and upper portion of it a blackish-brown spot; ruff white with narrow blackish edges, the upper portion of it washed with pale orange-rufous or creamy-buff; all the under surface, thighs, under wing and under tail-covert white, some of the feathers on the centre of the breast, flanks and under wing-coverts with a small blackish subterminal spot: bill fleshy-white: feet whitish; iris dark brown. Total length in the flesh 14.75 inches, wing 12, tail 5.4, exposed portion of bill 0.8, tarsus 2.35.*

ADULT FEMALE.—*Similar in plumage to the male, but larger, and everywhere on the upper parts of a richer orange-buff; the tail-feathers orange-buff, passing into white on the lateral ones, and barred and freckled with dark brown, as in the male; the white facial disc has the feathers of the ocular region washed with rufous, and the feathers of the ruff are black at the tips, the upper portion being of a deeper rufous-buff than in the male: on the under surface the blackish spots are far more numerous and evenly distributed and extend on to some of the longer under tail-coverts, and the sides of the breast are washed with orange-buff. Total length in the flesh 17.5 inches, wing 14, tail 7.*

Distribution.—Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia.

THE Masked Owl is widely distributed over the Australian Continent, and I have specimens now before me from all the States, but not from Central and North-western Australia. Specimens in the Old Collection of the Australian Museum, labelled "New South Wales," are indistinguishable from others labelled "*Strix castanops*, Tasmania." Mounted specimens of the latter, from Tasmania, are, however, slightly darker than those from New South Wales. In his notes it will be seen Mr. Malcolm Harrison refers to the variation in plumage of birds obtained in the Midland and southern parts of Tasmania, the latter of which agree more closely with *Strix nova-hollandie*. Although it may be found in Tasmania, I have never seen from that island any specimens agreeing with the birds above

described. The latter is the common form around Sydney, and it is remarkable that Gould, in his folio edition of the "Birds of Australia," should have figured under the name of *Strix personata* a bird more closely allied to *S. castanops* than *S. nova-hollandie*.

The preceding description of an adult male is taken from a specimen procured on the 14th June, 1905, by Mr. E. Thorpe, at Campbell's Hill, Cook's River, and the adult female from a specimen presented by Dr. James C. Cox (Crown Trustee), obtained at Liverpool, near George's River, New South Wales, both localities being in the neighbourhood of Sydney. Other specimens in the Collection obtained near the metropolis, are from Concord and Parramatta, and a few were obtained in the Illawarra District. There are also similar specimens from Victoria, South Australia, and Western Australia, and a female from the Northern Territory of South Australia. This bird was caught about one hundred miles inland from Port Darwin, and was brought down alive to Sydney and presented to the Trustees of the Australian Museum on the 3rd



AT A NESTING-PLACE OF THE MASKED OWL.

February, 1902. It varied from examples obtained near Sydney by the very much smaller white spots on the upper parts, and having the greater part of the under wing-coverts and under surface strongly washed with rufous-buff, and that it is not quite adult is proved by the short narrow blackish shaft streaks, as well as spots, on the under surface; wing 14 inches. Immature birds as a rule may be distinguished by the larger white markings on the feathers of the upper parts, the under parts being washed with orange-buff, by the larger and more wedged-shaped markings on the under parts, and which in still younger specimens have the feathers of the under surface more or less crossed with blackish-brown markings.

In New South Wales the Masked Owl is more often met with in the heavily timbered districts and open forest lands near the coast. Although it usually passes the day in some hollow bough, it is not a strictly nocturnal species, for it may be sometimes disturbed during the day time, while perched on some thick bough, but generally sheltered entirely with dense foliage. A pair of these birds have frequented Roseville, near Sydney, for a great number of years, their nesting-place being found by Mr. Frank Shelley down the hollow trunk of a live Grey Gum, which contained a single young bird. He informed me that there was the usual amount of fur pellets and small bones usually found in Owls' nesting-places. The foregoing figure is reproduced from a photograph I took on the 22nd June, 1911. One of the birds was flushed from the hollow, and remained all the time we were there perched in a large tree close by.

The late Mr. K. H. Bennett wrote in 1886 from Mossgiel, New South Wales, as follows:—
“In the early days of settlement of this part of New South Wales, and during the time of the rat invasion, *Strix novæ-hollandiæ* was very numerous, and committed great havoc amongst those rodents. During the day these Owls took refuge in the hollow trunks of the stunted Box-trees, that grew in scattered clumps on the plains, and to these retreats they were in the habit of bringing the rats or other small rodents caught during the night. Frequently these hollows were filled up to a depth of two or three feet with bones and the pellets or balls of fur disgorged by the Owls. When the rats disappeared these birds also took their departure, and they have not appeared here since. Of their nidification I know nothing.”

From Melbourne, Victoria, Mr. G. A. Keartland sends me the following notes:—I have only met with *Strix novæ-hollandiæ* twice in Victoria, and did not secure one. The last occasion was on a Sunday afternoon, when I was strolling near the Merri Creek, at North Fitzroy. A magnificent example flew past me, and perched on a rock about twenty yards away. I examined it carefully, and then walked up to within a few feet of it before it took flight in the direction of Studley Park. Dr. D'Ombraïn forwarded me a nice specimen from Casterton, in Western Victoria, where it was caught in a rabbit trap. I have reliable information that a pair breed regularly in that district, but their nesting place in the hollow spout of a dead tree is safe from the most ardent oologist. Along the banks of the rivers in the Northern Territory of South Australia they are fairly common, and I have received their eggs from the Daly River.”

Dr. Ernest D'Ombraïn wrote me as follows from Casterton, Victoria, on the 27th June, 1903:—“I recently became possessed of two very fine specimens of *Strix novæ-hollandiæ*. It is fairly common here during the cooler months, and often steals the rabbits caught in the traps of the rabbiters. I feel sure from observations that it also takes the life of the newly-born lambs, as the bodies present quite different external post-mortem appearances from those killed by foxes or dogs. The birds are exceptionally powerful, especially in the muscles of the thighs. A very fine specimen I had given me alive was taken by a trapper, who muffled his trap and placed a freshly taken rabbit close by. The Owl flew down from the fence post, where he had been perched during the preparations, and then walked sedately up and into the trap. This specimen measured three feet eight inches from tip to tip of the wings, and when standing erect reached about two feet in height. I have found the remains of the little ‘Flying Squirrel’ in the hollows where they camp. My friend, Mr. W. McLennan, and I have investigated many hollows in the big open forest timber, but were always doomed to disappointment, and we are now agreed that these Owls breed early like the Eagles and some of the Hawks in this district. We always looked for them in November and December, because we flushed a full grown young one from a nesting hollow in December, 1902. This hollow contained in one corner of it a three quarter shell, which enabled me to get an approximate size and idea of the egg. Owl's eggs being so round enabled this to be more readily done; breadth 1.5 inches, length nearly 2 inches. This fragment was white, and a little less rounded than Owls' eggs usually are.

The following notes probably apply to *Strix castanops*. I have never heard of its egg being taken except on the occasion referred to by Mr. Harrison:

From Hobart, Tasmania, Mr. Malcolm Harrison writes as follows:—"My chief acquaintance with *Strix novæ-hollandiæ* (*castanops*) has been through the medium of the rabbit traps, in which it is not infrequently caught, and the marked difference in size and colour of the specimens so caught would almost lead one to the belief that more than one species exists in Tasmania. This can, of course, be accounted for to a large extent by age and sex, but it is a strange coincidence that nearly all the specimens of the large bold looking bird with the dark facial disc and plumage, have been noticed in the Midland and Northern Districts, whilst the smaller and lighter coloured birds with the discs around the eyes almost white, have been obtained in the more southern parts. Mr. A. E. Brent was the first to draw attention to this. Of course this may be quite accidental, and the experience of others may not confirm it, whilst the number of specimens examined is hardly sufficient to enable one to assert positively that such a line of demarcation exists. There have been many authentic reports of the young birds being observed with the down still attached among the feathers, but in one instance only have I heard of the eggs, or rather egg, of this Owl being taken, viz., by Mr. R. Archer, of Landfall, East Tamar, who was to have let me have full particulars and measurements, but as he was just leaving for an extended tour on the mainland, I presume the matter escaped his memory."

Dr. L. Holden wrote me from Bellerive, near Hobart, Tasmania:—"On the 10th September, 1882, I found a decaying body of *Strix castanops* on the ground at the top of Eastern Inlet, the first I have seen. I saw one flying at Glenora, in Southern Tasmania, on the 3rd February, 1900. I was sitting after dusk in the verandah of a boarding-house, close to the railway station. It flew close past the house, having first announced its presence by a loud snoring sort of hiss, which an old bushman who sat by me mistook for the cry of an opossum. What is the present accepted opinion about *Strix castanops*? I can only say that Tasmania produces birds with deep chestnut discs and also snow-white discs, for I have handled both; particulars of other parts of their plumage I cannot supply. Probably the albinity denotes age."

The series of skins of *Strix castanops* in the Australian Museum is too small, and their sex uncertain, to satisfactorily answer this question. I can speak, however, with confidence as to *Strix novæ-hollandiæ*, knowing the species well, and by seeing specimens dissected, and that is the smaller bird with the white facial disc is the adult male, and the slightly larger one with the white facial disc more or less stained with chestnut is the adult female, and probably the same obtains with the Tasmanian form. Gould's remarks that the Tasmanian bird is larger than the continental one, is not borne out by the examination of a series of skins in the Australian Museum.

Strix candida.

GRASS OWL.

Strix candida, Tickell, Journ. Asiatic Soc. Beng., Vol. II., p. 572; Sharpe, Cat. Bds. Brit. Mus., Vol. II., p. 308 (1875); North, Rec. Austr. Mus., Vol. II., p. 13 (1892); Sharpe, Handl. Bds., Vol. I., p. 302 (1899).

ADULT MALE.—General colour above dark brown, the bases of most of the feathers orange-buff, which extends on to the sides of the feathers of the hind-neck, and having a white spot near the tip; lesser wing-coverts and some of the concealed scapulars orange-buff freckled with dark brown, the median and greater wing-coverts dark brown, all but the outer ones with very pale orange-buff bases irregularly mottled or freckled with dark brown; quills orange-buff, dark brown on the apical portion of the primaries and outer secondaries, and passing into greyish-white at their extreme tips.

finely speckled with dark brown, and which extends irregularly along the outer webs of the primaries, and increasing in extent on the outer secondaries; the inner webs of most of the secondaries white; upper tail-coverts like the back; central pair of tail feathers very pale orange-buff, the remainder whitish, and all barred across with dark brown and mottled or speckled with buffy brown, decreasing in extent towards the outermost feather on either side; feathers on the crown of the hood brown, finely spotted with white, their bases pale orange-buff; facial disc white with a blackish-brown spot in front of each eye; ruff pure white washed with orange-buff on the inner side above each eye, only the outer portion being blackish-brown; sides of the neck and all the under surface and under wing-coverts whitish, each feather with a blackish-brown spot near the tip, the sides of the neck and the chest faintly washed with orange-buff; under tail coverts pure white; bill flesh colour, darker on the apical portion; legs and feet whitish; iris dark brown. Total length in the flesh 14.25 inches, wing 12, tail 4.5, exposed portion of bill 0.9, tarsus 3.

ADULT FEMALE.—Similar in plumage to the male.

Distribution.—Queensland, New South Wales, Victoria.



GRASS OWL.

THE Grass Owl may easily be distinguished from all other members of the genus *Strix* inhabiting Australia by its long legs; otherwise on the under parts it more closely resembles a large example of *S. delicatula*. It has a wide ultra-Australian range, being found in South-eastern Asia, Formosa and the Philippine Islands, the type being described by Tickell, in the "Journal of the Asiatic Society of Bengal." Throughout Eastern Australia it is sparingly distributed, and is essentially an inhabitant of the coastal scrubs and adjacent open grass-lands, and is by far the rarest member of the genus *Strix* inhabiting the island-continent. Some specimens have the upper and under surface and ruff more strongly washed with orange-buff, and the white facial disc stained with dull chestnut.

The late Mr. J. Diggles recorded it as an Australian species, in his "Ornithology of Australia," under the name of *Strix walleri*, where he remarks:—"This fine new species of Owl is now figured for the first time, and it is with much pleasure I name it after the discoverer, Mr. Eli Waller, of Brisbane, to whose large

and valuable collection I am so much indebted for most of my figures, and to whose scientific and extensive practical knowledge of the birds of Australia, and energy and perseverance as a collector, I am happy to bear testimony. It does not often happen in a country so well searched as Australia, since the visit of Mr. Gould in the years 1838-40, so important and interesting a species as the present is brought to light, and the fact of this new species having been shot in the immediate neighbourhood of Brisbane, may serve to encourage others interested in the study of ornithology (more especially in the newly settled districts, where novelties are mostly to be looked for), to endeavour to add their contributions to the very numerous and interesting fauna of their adopted country. Nothing is as yet known of the habits of this species, but it doubtless assimilates in every important respect to the family in general. Its nearest ally is *Strix delicatula*, a much smaller species, which, like the present, has the tarsi naked for about half their length, the remainder of the Australian Owls yet known being leathered to the toes."

Writing me in July, 1909, from Melbourne, Victoria, Mr. G. A. Keartland sends me the following notes:—"The Grass Owl (*Strix candida*) is very rare near Melbourne, but occasionally these birds may be disturbed from the grass tussocks near Beveridge. Several years ago great numbers of mice overran the Wallan District, and the Grass Owl suddenly became common, and many were caught in the rabbit traps, but as soon as the mice disappeared the Owls went too."

Mr. J. A. Boyd, while resident at Ripple Creek, Herbert River, North-eastern Queensland, sent me the following notes relative to the nidification of *Strix candida*:—"This Owl nests on the ground, choosing a high thick tussock of grass, forming a bower in it, and laying its eggs on the few grass blades that have been trampled down. On the 1st June, 1884, I found two nests, each of which contained three young ones and one egg. It is a curious fact that though this bird always lays four eggs, I never found more than three young ones, one egg being always addled. A friend of mine here has also had the same experience. It seems strange that the bird should lay one egg more than she is able to hatch. When first I came these Owls were comparatively common, but latterly they have almost disappeared from this immediate neighbourhood, owing I think to the largely increased number of cattle running over the plain."

Two eggs taken by Mr. Boyd are more elongated than is the rule with most Owl's eggs, and may be described as thick ovals in form, white, the shell, with the exception of a few limy excrescences at the larger end, being perfectly smooth and lustreless. They measure:—Length (A) 1.69 × 1.72 inches; (B) 1.73 × 1.26 inches.

ORDER STEGANOPODES.

Family PHALACROCORACIDÆ.

Sub-family PHALACROCORACINÆ.

Genus PHALACROCORAX, *Brisson***Phalacrocorax carbo.**

BLACK CORMORANT.

Pelecanus carbo, Linn., Syst. Nat., Vol. I., p. 216 (1766).

Phalacrocorax carbooides, Gould, Bds. Austr., fol., Vol. VII., pl. 66 (1848).

Phalacrocorax nova-hollandia, Gould, Handbk. Bds. Austr., Vol. II., p. 488 (1865).

Phalacrocorax carbo, Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 340 (1898); Sharpe, Hand-l. Bds., Vol. I., p. 232 (1899).

ADULT MALE (in breeding plumage).—*General colour above and below black, glossed with bluish-green, the feathers on the lower neck having a purplish shade; feathers of the back, scapulars and upper wing-coverts brown, glossed with bronze, and margined with bluish-green, the quills darker and having a bronzy wash, more pronounced on the outer webs of the secondaries, the bluish-black margins narrower and less distinct, and which are entirely lost on the outermost primaries; tail-feathers black with a bluish-green gloss; upper part of throat dull white; narrow feathers on the crown of the head, and extending down the greater portion of the neck, white; on each flank a patch of white feathers; bill whitish-horn colour, brown along the culmen, fleshy or yellowish-white at the base; gular sac rich yellow; legs and feet black; iris emerald-green. Total length in the flesh 34.5 inches, wing 13.8, tail 7, bill 2.55, tarsus 2.35.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—Queensland, New South Wales, Victoria, South Australia, Western Australia, North-western Australia, Northern Territory of South Australia, Tasmania.

THE Order Steganopodes, represented in Australia by the Cormorants, Darter, Gannets, Frigate-birds, Tropic-birds and Pelican, is brought into greater prominence by its various members feeding almost exclusively on live fish. They frequent the rocky islets lying off the coast, estuaries of rivers, the bays and inlets of the mainland, and the Cormorants, Darters and Pelicans also visit the rivers and lakes of the interior, breeding usually in large numbers together and sometimes incubating with one another.

The range of the Black Cormorant, or Shag, is world-wide. It is generally distributed in favourable situations over the greater portion of Eastern, Southern and South-western Australia, Tasmania and some of the adjacent islands. According to Mr. Ogilvie-Grant in the "Catalogue of Birds in the British Museum," its ultra-Australian range consists of the Atlantic coast of North America, from Hudson's Bay to Georgia, South Greenland, Iceland, Faroes, thence across Europe and Asia to Kamtschatka, southwards to the Cape of Good Hope, and from the Mediterranean to the Malay Peninsula, New Zealand and Chatham Islands.

Frequently these birds may be seen associated together in small flocks on sand banks, on the flats at the entrance of tidal rivers, and often perched on piles or snags in rivers. The remaining upright piles of an old jetty, or channel beacons, as may be seen by their whitened surface, are favourite perches for this species, and in fact all species of Cormorants. The very

* Cat. Bds. Brit. Mus., Vol. XXVI., p. 347 (1898)

thick shafts of the tail-feathers render them almost perfectly rigid, and acts for the Cormorant like a flapper does for the Seal. These birds, when on a rock, sit bolt upright, and are partially supported by the tail-feathers. A frequent attitude of repose is to sit motionless with outstretched wings, but its element is the water, in which it seems to be as much at home almost as its finny prey, on which it subsists. It dives with ease, reappearing after what appears to be an unusual length of time, perhaps with a fish in its bill, some distance away. I have often watched these birds from a bridge fishing in the stream below, and the body appears almost submerged in the water, and not in the usual attitude of a Gull or Duck swimming on its surface. During the non-breeding season the adult birds lose the long white feathers on the head and neck, also the white patch of feathers on the flanks.

To give some idea of the amount of money expended in the destruction of Cormorants, and of the damage these birds do to the fisheries of New South Wales alone, I have collected the following evidence from the Official Reports of the Fisheries Board of New South Wales. It is gleaned chiefly from the reports of various Inspectors of Fisheries, officers who, by their vocation, are able to speak with experience and authority on the subject. In the Report for the year ending 31st December, 1890,† it is stated:—"Under the Fisheries Regulations the extinction of Cormorants or Shags—birds very destructive to fish—was promoted by means of a reward for each bird destroyed. These birds exist in vast numbers on the Murray River, and the claim upon the Department for their destruction has amounted during the past and present year to no less a sum than £1501 17s. 10d. The provision of the regulation has been but very partially availed of, except on the Murray, and as the riddance of these voracious pests on that water could not, under the circumstances stated, produce adequate beneficial result to the colony, we considered it desirable to obtain its repeal, further expense in this direction will thus be saved. The mode in which these birds were captured in the Murray District may be of interest. Taking advantage of their habit to congregate in thousands, and to build their nests in swamps, the blacks and half-castes, noting the locations, made raids on their nests at the proper time in the breeding season, and captured all the fledglings, and as each nest contained on an average three birds, it was not a difficult matter to collect a considerable number in a short time and with comparatively little trouble." In the Official Report of the Fisheries for the year 1895‡ it is stated:—"We have pleasure in acknowledging the receipt of some fine specimens of trout, which had been caught in the waters of the colony, clearly proving that our endeavours in the past to acclimatise this species of fish have been marked with success. A Cormorant, the natural enemy of the trout, caught a splendid specimen at the Prospect Dam, weighing 10 ounces and measuring 11 inches in length."

In the Report of the Board for the year 1906 of the "Fisheries of New South Wales,"§ Mr. E. J. Paton, Inspector of Fisheries at Port Stephens, writes:—"I have, by observation, tried to form an estimate of the number of Cormorants in the Port Stephens waters, not including the coastal waters outside the Heads. I estimate their number not to average less than three thousand, perhaps four thousand, and the daily food of each Cormorant one dozen live fish, weighing four pounds; three thousand Cormorants eating four pounds of fish each daily is over five tons of fish daily—we will call it five tons for purposes of this illustration—or eighteen hundred and twenty five tons yearly; placed in fish baskets, thirty baskets to the ton, it will amount to fifty-four thousand seven hundred and fifty baskets, and if valued at ten shillings per basket is worth £27,375. When we consider that this pest, which lives exclusively on live fish, and partial to our best edible kinds, are spread over all or nearly all the fish-carrying waters of the State, we can faintly realise the amount of destruction they are responsible for. The systematic destruction of this pest seems to me to be a matter the Federal authorities ought to deal with, as I believe these birds are found all over the fish-carrying waters of the Commonwealth. I

* Rep. Comm. Fisheries N. S. Wales, p. 3. † *Ibid.*, p. 5. ‡ *Ibid.*, p. 51.

have it on the authority of fishermen who have fished in Bass's Strait, that the Cormorant rookeries on the islands there breed enough birds to stock the whole of Australia; perhaps if attention was given to the breeding habits of the pest, they could be dealt with during that period in their rookeries in a manner sufficiently effective to bring about a yearly diminution in their numbers; the result would be a proportionate increase in the edible fish life in the waters of the Commonwealth." In the "Report of the Board for the year 1907"^{*} is the following relative to the destruction of fish by Cormorants:—Owing to the formation of a sand bar at the entrance of Smith's Lake, the lake waters were closed from the ocean for about two years, and were heavily stocked with fish. Large flocks of Cormorants—estimated at about two thousand—were observed to be very busy attacking the fish, and performed evolutions in a very systematic manner, by working in droves and forcing the small fish from the weedy bottoms into clear water by united action. Then they attacked them in closely packed bodies, and held them securely in the clear water until they had gorged themselves, and in this manner accounted for the destruction of vast numbers of small fish. The sum of £100 was voted on the estimates of 1907-8 in payment of awards for the destruction of Cormorants, and a reward of 4d. was offered for each head. The adjoining States are also taking steps to reduce the number of these pests, and are offering the following rewards per head for their destruction:—Queensland 1/6, Tasmania 1/-, Western Australia 1/6, South Australia 1/-, New Zealand 1/- to 3/6. In Victoria no rewards are offered, but periodical raids are made by inspectors and the police, who are supplied with ammunition for shooting them. Mr. J. A. Brodie, Chief Inspector of Fisheries, in his "Report on Trout Waters, Tumut to Cooma, *via* Snowy River," remarks:†—In all the waters visited complaints were made of the destruction of trout by Cormorants, and it was ascertained that the Fish and Game Protection Society at Cooma is offering a reward of 1/- per head, in addition to the reward of 4d. per head offered by the Department, for these fish-eating birds. Again in the Report of the Board for the year 1908‡ Mr. H. E. Bridle reported that the trout anglers who visited Brindabella during the season formed a fund for the destruction of Cormorants, and that a reward of 3/- was paid in the beginning of the season, which was increased to 5/- per head as the birds became scarce. Forty-seven were shot by the local residents, who claimed the rewards offered, and this river was practically freed of Cormorants for the time being. The destruction of fish by Cormorants is still very considerable in the coastal waters, where these birds are very numerous, and although they are not so plentiful in inland waters they are responsible for the destruction of large quantities of fresh-water fish, including trout. The general feeling on these waters is that larger rewards should be paid per head on account of the difficulty that is experienced in shooting them, and in some districts the Government reward of 4d. per head has been supplemented by private subscription, and as much as 5s. per head has been paid for each bird destroyed, with very satisfactory results as regards the diminution of these pests in those localities. During the year this Department has paid a sum of £118 4s. for the destruction of seven thousand and ninety two birds, at a price of 4d. per head, and an additional three hundred and thirty five have been shot by Inspectors of Fisheries, who have been supplied with ammunition for this purpose. Again Mr. E. J. Paton, Inspector of Fisheries at Port Stephens reports:§—The Cormorants still continue a pest in this district; there are, however, less to be seen in the open harbour waters than previous to the payment of 4d. per head for their destruction. They seem to resort to out of the way places in the lakes and rivers, where they are seldom disturbed. Although hundreds have been shot by sportsmen, for which no claim has been made, they continue a scourge in the lake and river waters, and the destruction wrought by them to fish life in the waters of the State must be enormous. The only solution to the problem of effectually reducing their numbers would seem to be by united action of all the States, or by the Federal authorities taking action.

^{*} Fisheries of N. S. Wales Report for 1907, pp. 5, 10. † *Loc. cit.*, 1907, p. 43. ‡ *Loc. cit.*, 1908, p. 22.
 § *Loc. cit.*, 1908, p. 48.

If any further evidence is required as to the destructive habits of Cormorants, it may be obtained by a visit to the Bird Room of the Australian Museum. Dr. C. Louis Gabriel, of Gundagai, who forwarded the specimen of the Black Cormorant (*Phalacrocorax carbo*) alluded to on the 15th October, 1897, sent the accompanying note with it:—"I am sending you a fine specimen of the Black Shag, which I obtained yesterday. The misguided bird met its death trying to swallow a fish a size too large. A score of boys were engaged for over two hours yesterday afternoon in chasing the unfortunate captor up and down a small anabranch of the Murrumbidgee River, near the Gundagai bridge. Eventually the Shag was

caught by a couple of Water Spaniels."

The bird in question, received in the flesh the day after it was caught, had the hinder half of a Murray Cod (*Oligorus macquariensis*) protruding from its widely distended mouth, the bird being unable to get it down or up by the spines of the fish's fins penetrating right through the thin fleshy skin of the throat; the combined weight of the bird and fish totalled 5lbs. 10z. After taking accurate measurements, with some difficulty I succeeded in removing the fish, which was quite fresh, the fore part of the head alone being partially digested, measuring over all thirteen and a half inches, and weighing one pound one ounce. The bird and fish were then skinned and finally set up for exhibition purposes just as received. The voracity of these birds could be accurately gauged by the weights each of the bird and fish, four pounds nine ounces and one pound one ounce respectively, the Cormorant attempting to swallow a fish nearly a quarter of the entire bird's weight. On the 7th December, 1911, Dr.



BLACK CORMORANT ATTEMPTING TO SWALLOW MURRAY COD.

Gabriel presented a somewhat similar specimen to the Trustees of the Aus-

tralian Museum, which was shot by a man on Morley Creek, Gundagai. The mouth and throat of the specimen were distended to a considerable size by a partially swallowed Golden Carp, or "Gold-fish" (*Carassius auratus*). Accurate measurements were taken of both specimens when received, and they have been beautifully prepared and set up in a like manner by Mr. Robt. Grant, Taxidermist of the Australian Museum. In addition to the perfect fish, a partially digested one five inches in length was found in the bird. The latter weighed four pounds twelve ounces, and the Carp thirteen ounces.

In Eastern Asia, as is well known, Cormorants are trained and have long been used for fishing purposes, and Mr. H. E. Dresser in his "Birds of Europe" briefly refers to it as follows:—"The Chinese have long used Cormorants for fishing, and have them in excellent training, and in England they have also been used for the same purpose; and even now Mr. F. H. Salvini,

the well known falconer, keeps trained Cormorants. Pennant relates that he had a cast of Cormorants, one of which was presented to him by Mr. Wood, Master of the Cormorants to Charles I. When taken out to fish the birds have a collar round their neck, which prevents them swallowing the fish they catch; when they have caught a sufficient quantity, the collar is taken off and they are allowed to fish for themselves."

Stomachs of Black Cormorants examined obtained at Botany and Lake Narrabeen, in the neighbourhood of Sydney, contained more or less perfect specimens of various kinds of small fish, as a rule rarely of more than one or two species, but a very great number of them, the stomachs being perfectly gorged with fish, consisting chiefly of young whiting, flounder, bream, mullet, pilchards, garfish (minus their heads), and trevally. Those from inland waters contained mostly young Murray Cod, perch, carp and eels. As all species of Cormorants inhabiting Australia and Tasmania live almost exclusively on live fish of various kinds, with an occasional frog, crustacean, or aquatic insect, according to the localities they frequent, no further reference will be made to their food.

The nest, an open and nearly flat structure, is formed of dead sticks, twigs, aquatic herbage and debris, and is either placed on a horizontal branch of a tree, or at other times on a ledge of rock. More often they breed in large companies, but isolated nests are sometimes found.

From Copmanhurst, Upper Clarence River, New South Wales, Mr. George Savidge sends me the following notes:—"The Black Cormorant (*Phalacrocorax carbo*) is sparingly dispersed along the course of the main Clarence River, and is usually found in pairs or small flocks. I have found their nests upon three occasions only; in each case it was placed on a rock standing well out in the river, and could only be reached by swimming. They breed in this locality during May and June; the nest is a large structure composed of rushes and aquatic herbage, and three and four eggs are laid for a sitting. The rocks in the vicinity of their nests are white with excreta, and can be seen a long way off. These birds seem ungainly and clumsy on shore, and move about with a wobbling gait, but they have great powers of wing when once in the air."

In forwarding me a set of eggs for examination Mr. Savidge wrote as follows:—"The set of three eggs of *Phalacrocorax carbo* were found opposite Gordon Brook Station; the nest was placed on a rock standing out of the Upper Clarence River, and the black who took them placed the eggs in his hat while he was swimming to the bank. The same bird built there again, but floods came down and washed the nest away."

The late Mr. K. H. Bennett writing from Mossgiel, New South Wales in 1884, remarked:—" *Graculus carbo* is rather plentiful here in seasons and localities suitable to its habits. It breeds during the months of October and November, and the nest, composed of aquatic grasses is placed on the dense flat top of a low *Polygonum* bush standing in the water, and although I have on several occasions examined nests I have never found more than one egg. Once I found a nest of this species in possession of a Coot (*Fulica australis*) in which were six Coot's eggs and one of the Cormorant, the latter bird was sitting on the nest when I discovered it, and slid quietly off and disappeared under the water as I approached the nest."

From Melbourne, Victoria, Mr. G. A. Kearthland sends me the following notes:—"I have seen the Black Cormorant (*Phalacrocorax carbo*) in every part of Australia I have visited. It is equally at home in fresh water or the sea. I saw one on the Yarra River capture an eel weighing twenty ounces, which it brought to the surface after a dive and almost immediately swallowed. I shot the bird and extracted the eel still alive. I have watched them catch bream in the Salt-water River which appeared too large to swallow, but owing to the flexibility of its lower mandible it accomplished the task easily. At Brookman Creek, North-western Australia, I saw them catching frogs and yabbies in the shallow waters of the creek. It is surprising in what

shallow water they can dive and keep below the surface for a long distance. Although so widely dispersed over the continent, comparatively few of their breeding places are known. I had several clutches of their eggs taken near the Daly River, in the Northern Territory of South Australia."

From Tasmania Dr. L. Holden sent me a photograph of a nesting-place of *Phalacrocorax carbo* he found on an island at the outlet of Lake St. Clair, Tasmania.

From Tasmania Mr. R. N. Atkinson has kindly sent me the following notes:—"On the 8th of October, 1909, I found a number of Black Cormorants (*Phalacrocorax carbo*) breeding in Tea-trees in a secluded lagoon on Flinders Island, Bass Strait. The nests were placed in the most secure positions afforded by the trees, from about three feet to eight feet above the water, and varied considerably in size and form according to their situation. The outer dimensions of an average nest measured eighteen inches across, and inside eight inches in diameter by three inches in depth. Some which had evidently been used for several seasons were much added to where the branches were strong enough to allow of the extra weight, and with but slight increase in breadth were about three feet high, and somewhat sloping to one side. One nest contained a young bird and three eggs, others incubated or fresh eggs, and some were being built or renewed. They were composed of twigs, lined with smaller twigs and scanty pieces of bark or a few feathers, and were coated outside with excrement, which made it easy to locate them from a considerable distance to leeward. The birds were very timid, and left the nests on my approach, and until I was well out of sight continued to circle about the lagoon. On the 18th I revisited these nests, but found them empty and deserted, no birds being in the vicinity. On the 20th of the same month I found more of these birds nesting with *P. melanoleucus*, under similar circumstances, and it was only after standing up to my waist in very cold water that I could examine the nests and secure the eggs. The birds had in the meantime taken wing, and I noticed amongst them a Little Black Cormorant (*Phalacrocorax sulcirostris*), the only example of this species I saw on the island. The nests of *Phalacrocorax carbo* contained as before young birds or fresh or incubated eggs, and some nests had not been completed. In one I found three young and two eggs on the point of hatching. On passing this nest a second time I noticed that a young one had disappeared, and before I left all three had been taken, and I was just in time to see the thief, a Raven or Crow, disappearing over the tree tops, carrying a tiny form in its claws, no doubt the last of the ill-fated nestlings. The nests contained three to five eggs for a sitting. Newly hatched young were dark brownish-black, and entirely devoid of any downy covering, and made a noise like the croaking of a frog. On the 4th November I revisited the nests, and found them quite empty, and except for a solitary Little Black and White Cormorant (*P. melanoleucus*) the lagoon was deserted."

From Tasmania again Mr. E. D. Atkinson writes me:—"I had a fortnight at the Furneaux Islands, Bass Strait, in November 1910, spending most of my time among the many lagoons on Flinders Island in search of eggs of the Black Cormorant (*Phalacrocorax carbo*), but after many miles of walking and wading I was unsuccessful. My son obtained some eggs the previous season from two lagoons, but I found the birds had in each case forsaken the place, and only the nests were there. I think these are the wariest birds in existence as regards their nesting habits, and I have never yet known them to breed again in the same place after being once disturbed."

From Hobart, Tasmania, Mr. Malcolm Harrison wrote me:—"This Cormorant (*Phalacrocorax carbo*) is plentiful enough in Tasmania, although it is not usually seen in flocks as is the White-breasted species. I have been more accustomed to meet a solitary bird fishing in a quiet pool of one of the inland streams, and in such cases the 'fisherman' has a particularly good idea of taking care of himself, and it is with difficulty that one can get within range with a shot gun. For years I have endeavoured to find out the breeding haunts in this State with

little success. The late Mr. J. J. Butler, of 'Bashby,' who possessed also an estate, 'Bashan' at Lake Echo, informed me that many years ago he found them breeding on an island in that lake. Subsequent visits to the island, however, proved that they had ceased to do so. Mr. J. L. Butler, however, found several nests on the Upper Derwent River, near Lake St. Clair, and I have seen what remained of a set he obtained. The exact measurements I regret to say I did not obtain, but they appeared about the same as those of the *Phalacrocorax leucogaster*, but rather thicker in proportion to their length.

The eggs are three to five in a sitting, elongate oval in form, tapering gently towards the smaller end, which in some specimens are rather pointed. They are of a uniform pale bluish-white, thickly and uniformly coated with a limy covering, and frequently present a roughened surface as if they had been scratched when the lime was soft by the feet of the sitting bird, and often they are scratched. A set of three in Mr. George Savidge's collection, taken on the 25th July, 1872, at Gordon Brook Station, on the Upper Clarence River, New South Wales, measures:—Length (A) 2.44 × 1.47 inches; (B) 2.33 × 1.49 inches; (C) 2.38 × 1.5 inches. A set of two in the Museum Collection measures:—Length (A) 2.45 × 1.6 inches; (B) 2.47 × 1.6 inches. A set of two in the Macleay Museum measures:—Length (A) 2.38 × 1.45 inches; (B) 2.47 × 1.65 inches.

Young birds resemble the adult, but are everywhere much darker in colour, the feathers of the head, neck and under parts are brown and have many dull white feathers on the neck, centre of the breast and abdomen. Weight, 2.75 inches.

July until the end of October continues the usual breeding season in Eastern Australia, September to the end of December in Tasmania.

Phalacrocorax sulcirostris.

LITTLE BLACK CORMORANT.

Carbo sulcirostris, Brandt, Bull. Acad. St. Petersb., Vol. III., p. 56 (1837).

Phalacrocorax sulcirostris, Gould, Bds. Austr., fol. Vol. VII., pl. 67 (1848); Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 376 (1898); Sharpe, Hand-l. Bds., Vol. I., p. 233 (1899).

Phalacrocorax stictocephalus, Gould, Handbk. Bds. Austr., Vol. II., p. 495 (1865).

ADULT MALE. (in breeding plumage).—*General colour above and below black, glossed with green; feathers of the upper back, the scapulars and all but the smaller upper wing-coverts ashy-grey margined with black; tail-feathers dull black; on the crown of the head and upper portion of the hind-neck are a number of small white feathers; in some those on the head are confined to a broad band over the eye; bill dark grey, culmen and tip black; legs and feet black; iris dark green. Total length in the flesh 25 inches, wing 10, tail 6, bill 1.75, tarsus 1.75.*

ADULT FEMALE (in breeding plumage).—*Similar in plumage to the male.*

Distribution.—North western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia, Tasmania.

IN favourable situations the Little Black Cormorant is generally distributed over the greater portion of the coast line of Australia, and it frequents the rivers and lakes of the inland portions of the States, its range extending to New Guinea, the Moluccas, Java and Borneo.

To give an account of its habits, food, and nidification would only be to repeat what has already been written of the preceding species, from which it may be principally distinguished by its smaller size and the absence of the white patch on each side of the flanks. Like *Phalacrocorax carbo* it loses the narrow white feathers after the breeding season is over, and there is a difference in the wing-measurement of some specimens, varying from nine to ten inches in length.

In the neighbourhood of Sydney, New South Wales, it is very common, and is often seen in company with the Little Black and White Cormorant (*Phalacrocorax melanoleucus*). It may be seen frequently on sandbanks and piles in the Parramatta, George and Cook Rivers, also on the shores of Botany Bay, Port Hacking, and Dee Why and Narrabeen Lagoons. Some of the specimens in the Australian Museum Collection were obtained by the late Mr. J. A. Thorpe in the Centennial Park, Randwick, while others were procured at Balmain. I have met with it inland on the Namoi, Gwydir, and Castlereagh Rivers, and at the watercourse into which the Gwydir River spreads over, about nine or ten miles north of Moree. It is also very numerous among the bays and inlets of Port Stephens.

Mr. George Savidge writes me as follows from Copmanhurst, Upper Clarence River:—"The Little Black Cormorant (*Phalacrocorax sulcirostris*) is the commonest species I have observed at Yamba, at the mouth of the Clarence River; I have also seen it in large colonies on the waters of the Upper Clarence, and have been surprised by the way they rush through the air, while standing at some corner waiting for Ducks to pass. At Yamba I have seen very large flocks, comprising several hundreds, and it may be observed flying low over the water searching for shoals of small fish. When a shoal is found the birds drop down in all directions amongst them, and the scene is very lively for a time, the fish jumping out of the water in all directions pursued by the birds, and which the latter sometimes catch in the air. When their hunger is satisfied they perch in scores on the viaducts that run over the training walls. I have never been successful in locating their breeding haunts, although no doubt they are not far away; the odour from the birds may be smelt a long distance away. It always reminds me of the roosting place of the English Starling."

Mr. R. N. Atkinson writes me from Tasmania:—"I have never met with *Phalacrocorax stutecephalus* here, but saw a single bird in company with *P. nova-hollandia* and *P. melanoleucus* on Flinder's Island, Bass Strait, on the 20th October, 1909."

The eggs are usually five, sometimes six, in number for a sitting, oval or an ellipse in form, some being very much lengthened, of a pale blue or greenish-white colour, which is usually more or less obscured with a coating of lime, and vary considerably in size even in the same set. A set of five taken by Mr. S. Robinson on Buckinguy Station, near Nyngan, New South Wales, on the 14th October, 1903, measures as follows:—Length (A) 2 × 1.24 inches; (B) 1.92 × 1.25 inches; (C) 1.75 × 1.24 inches; (D) 2.02 × 1.27 inches; (E) 1.9 × 1.31 inches; (F) a runt egg, 1.37 × 0.92 inches. A set of five taken in the same locality on the 26th October, 1903, measures:—Length (A) 1.97 × 1.3 inches; (B) 1.98 × 1.23 inches; (C) 1.92 × 1.27 inches; (D) 1.81 × 1.27 inches; (E) 2 × 1.2 inches.

Phalacrocorax gouldi.

WHITE-BREASTED CORMORANT.

Phalacrocorax leucogaster, Gould (*nov. Vieill.*), Proc. Zool. Soc., 1837, p. 156; *id.*, Bds. Austr., fol. Vol. VII., pl. 69 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 492 (1865).

Hypoleucus gouldi, Salvad., Orn. Pap. et Mollucc., Part III., p. 413 (1882).

Phalacrocorax gouldi, Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 396 (1898).

ADULT MALE.—"Forehead, crown of the head, back of the neck and rump greenish-black; back and wing-coverts deep green, each feather narrowly margined with black; primaries and secondaries black; throat, front and sides of the neck, and all the under surface white; bill and feet black; naked skin at the base of the bill and round the eye purple; iris green. Total length 26 inches, wing 11.5, tail 5.75, bill 2, tarsus 2.25" (Gould)

ADULT FEMALE.—Similar in plumage to the male.

Distribution.—New South Wales, Victoria, South Australia, Islands of Bass Strait, Tasmania.

ALTHOUGH inhabiting New South Wales, personally I have never to my knowledge seen this species in a state of nature, nor have I ever handled a freshly killed specimen in the flesh. According to Gould's description the "naked skin at the base of the bill and round the eye purple," should enable one to easily distinguish it from its close ally *Phalacrocorax varius*, which it otherwise closely resembles. Gould writes:—"This species is very abundant in all the bays and inlets of the sea surrounding Tasmania; it ascends the rivers almost to their source, and the large lakes of the interior are seldom without its presence. It breeds on most of the



WHITE-BREADED CORMORANT.

islands of Bass Straits, where it constructs a round nest of seaweed on the ledges of the low rocks, and lays two bluish-white eggs. It becomes far less numerous as we proceed northward, but is to be found in all the localities suitable to it throughout the whole coast of South Australia. I have also seen it on the Hunter, as well as in Spencer's and St. Vincent's Gulfs. In a state of nature it is a showy and attractive bird, the decided contrast in the colouring of its plumage rendering it a conspicuous object at a considerable distance, particularly when it is reposing in flocks on the craggy summits of the low black rocks forming the margins of the rivers, or when

perched side by side on the bare branches of the trees overhanging the water. The sexes are so nearly alike in their plumage, that it is impossible to distinguish them without the aid of dissection; the spring or nuptial dress is characterised by long white feathers springing from the sides of the neck, which are entirely absent at other seasons."

The late Mr. H. P. C. Ashworth, who formed one of a small party of the Field Naturalists' Club of Victoria to visit the Furneaux Group, at the eastern entrance to Bass Strait, in November, 1893, kindly forwarded me a photograph of a nesting colony of White-breasted Cormorants, taken on Storehouse Island, lying off Flinders Island. The nests, he informed me, were well constructed large open structures, formed chiefly of seaweed and other marine growth, about eighteen to twenty inches across, some of them in particular being thickly coated with excreta, and containing chiefly young in down, although fresh eggs were also found, usually two or three in number for a sitting, while scattered around some of them were the remains of fish in all stages of putrefaction. The nests, as will be seen by the accompanying figure, are placed upon the flat rocks; others are deep structures formed by filling up the cavities between two rocks, and some are built close to the small rocks on the sand. Mr. Joseph Gabriel, leader of the party, thus refers to the visit in "The Victorian Naturalist,"† 21st November, 1893:—"The wind had changed and was blowing right in to the cove, so that there was nothing for it but to kedge the boat out far enough to get an offing, when we set sail again for Storehouse Island, anchoring within one hundred yards of the Cormorant rookery. While having breakfast we were deeply interested with the movements of the birds. Landing we soon got to work, and

* Handbk. Bds. Austr., Vol. II., p. 492 (1865). † Vict. Nat., Vol. X., p. 173 (1894)

our leader taking a long tramp round the island, when he returned he found the artists had finished photographing and recording observations of the rookery. The birds in this instance did not allow us to drive them off the nests, but went without asking. We did not linger here, as the noise of the young ones was unpleasant, while the pungent, ammoniacal aroma of the live guano was still more unpleasant. The nests were built of herbage and seaweed, and in some instances were skilfully placed on shelving rocks. The full clutch of eggs numbers three. On our leaving the rookery the old birds soon rejoined their young."



NESTING COLONY OF WHITE-BREASTED CORMORANTS.

Mr. G. Savidge wrote me as follows from Copmanhurst, Upper Clarence River, New South Wales:—"The White-breasted Cormorant (*Phalacrocorax gouldi*) is a scarce bird in the Clarence River District. I know very little about it."

From Victoria Mr. G. A. Kearnland wrote me:—"The White-breasted Cormorant (*Phalacrocorax gouldi*) is more numerous on the southern coast and the islands of Bass Straits than in the north. These birds seem to be more partial to salt water than fresh. They breed in colonies on several islands in the Straits and around Tasmania. I received a number of sets of their eggs taken on Maatsuyker Island, lying off the south coast of Tasmania."

Mr. Joseph Gabriel wrote me from Abbotsford, Victoria:—"I found the White-breasted Cormorant (*Phalacrocorax gouldi*) breeding on Storehouse Island, Furneaux Group, in great numbers. Unlike the Gannets on Cat Island (who remained on their nests) they flew off as we approached them. We found eggs in all stages of incubation, also young of all ages. We did not linger after taking photographs, &c., leaving the young to cuddle together for warmth. I have often wondered whether the old birds succeeded in sorting them out again properly. The full clutch of eggs was three. Nests were built on shelving rocks, of herbage and seaweed; in many instances they were works of art. I also found a rookery of these birds on the Hunter Group, in October, 1895, but the birds were only just starting to build, and had not laid any eggs."

Dr. Lonsdale Holden wrote me as follows, while resident at Circular Head, on the north-western coast of Tasmania: "On the 13th April, 1892, I shot a supposed young one of *Phalacrocorax leucogaster* on the shore of Circular Head Peninsula; a large gurnet was in its crop and gullet, and it allowed my approach while standing on the beach, so I thought it was seriously injured or ill."

Mr. E. D. Atkinson writes me from Tasmania: "*Phalacrocorax leucogaster* was found breeding on a small island of two or three acres in extent in West Bass Straits, near Walker Island, on 2nd October, 1905. Also on an exposed rock five or six miles distant on the next day. In the former instance the nests were about twenty in number, whilst on the rock perhaps one hundred, placed two or three feet apart, and compactly built of damp seaweed; outer measurement nineteen inches, inside nine or ten inches. The nests were placed on the ledges of rock, varying from about six to fifteen feet above sea level, some on the most exposed part of the top of the rock, and others in sheltered crevices, which were whitened with excrement, and were more pleasantly approached from the windward side. Some nests contained three eggs, others two, and a great many only one, and a number were in the course of construction, and birds were walking up the rocks with mouths full of seaweed for this purpose. The eggs were, with few exceptions, fresh. Those most recently laid were of a pale bluish-green colour, thickly coated with lime. Others were covered with dark stains from the seaweed and birds' feet. The birds flew off in a large flock on being disturbed, returning to their nests directly we left the island."

From Hobart, Tasmania, Mr. Malcolm Harrison wrote me as follows:—"The White-breasted Cormorant (*Phalacrocorax leucogaster*) is very common throughout Tasmania, frequenting all the inland waters as well as those on the coast line. They breed freely, both on the Islands of Bass Strait and on the cliffs and islands of the southern coast, in rookeries varying in size from two or three nests only, as on Arch Island, to several hundreds."

The eggs are usually two or three in number for a sitting, but not infrequently only one is laid. Typically they are a lengthened oval in form, but vary to a swollen ellipse, and are of a uniform pale bluish-white, the shell being more or less coated with lime; in some specimens it is smoothly and uniformly distributed over the surface, completely obscuring the colour of the shell; on others it is roughened, appearing only here and there in irregular patches. A set of two in the Australian Museum Collection, taken by Mr. Joseph Gabriel on the 21st November, 1893, on Storehouse Island, Furneaux Group, Bass Strait, measures:—Length (A) 2·33 × 1·37 inches; (B) 2·35 × 1·5 inches. A set of two taken on the same date measures:—Length (A) 2·27 × 1·45 inches; (B) 2·32 × 1·47 inches. A set of two taken by Mr. E. D. Atkinson on the 2nd October, 1905, measures:—Length (A) 2·27 × 1·55 inches; (B) 2·28 × 1·55 inches. A set of three taken on the 23rd October, 1893, on De Wett or Maatsuyker Island, lying off the south coast of Tasmania, measures:—Length (A) 2·36 × 1·43 inches; (B) 2·36 × 1·5 inches; (C) 2·31 × 1·45 inches.

October and the three following months constitute the usual breeding season in Southern Australian and Tasmanian waters.

Phalacrocorax hypoleucus.

PIED CORMORANT.

Carbo hypoleucos, Brandt, Bull. Acad. St. Petersb., Vol. III., p. 55 (1837).

Phalacrocorax hypoleucos, Gould, Bds. Austr., fol. Vol. VII., pl. 68 (1848); Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 397 (1898); Sharpe, Hand-l. Bds., Vol. I., p. 234 (1898).

Phalacrocorax varius, Gould (*nee* Gmel.), Handbk. Bds. Austr., Vol. II., p. 490 (1865).

ADULT MALE (in breeding plumage).—*General colour above brown, the scapulars slightly darker, glossed with green, all the feathers, including the upper wing-coverts, having dark brown margins, the inner series of the latter blackish-brown; quills dark brown with a bronzy-green wash; lower back, rump and upper tail-coverts and tail-feathers blackish-brown with a bluish gloss; feathers on the crown of the head and back of neck black, their bases margined with whitish-brown; sides of the head and neck, all the under surface and under tail-coverts pure white; outer side of thighs blackish-brown, nearly black, with a slight greenish gloss; bill horn colour, sides of the lower mandible ashy-white, the gular sac yellow; space in front of the eye rich orange; legs and feet black; iris light green. Total length in the flesh 30 inches, wing 12, tail 7, bill 2.75, tarsus 2.45.*

ADULT FEMALE (in breeding plumage).—*Similar in plumage to the male.*

Distribution.—Queensland, New South Wales, Victoria, South Australia, Western Australia, North-western Australia.

THE Pied Cormorant is distributed over the coastal districts and adjacent islets of all but the northern and extreme north-eastern portions of the Australian Continent. It is, however, far more common in its vast breeding haunts, the southern and western portions of its range, than it is in Eastern Australia, to the latter of which it is an irregular visitor, and not a permanent resident. To the estuaries, bays and inlets of Eastern New South Wales it may appear in large numbers, principally during the winter and early spring months, and then be absent again for years. It visited the neighbourhood of Sydney in large flocks from July to October, 1892, and many specimens were obtained at Narrabeen Lake, Botany Bay, and the Hawkesbury, Parramatta and Cook Rivers, and from further north at Port Stephens and on the Bellinger River.

Kangaroo Island, South Australia, and the islets of Spencer and St. Vincent Gulfs, have for many years contained large breeding colonies of the Pied Cormorant.

Mr. Bernard Woodward, F.G.S., Director of the Perth Museum, Western Australia, presented photographs of the nesting-place of *Phalacrocorax hypoleucus* on Middle Island, near Gun Island, Houtman's Abrolhos, Western Australia, taken by Mr. O. Lipfert in October, 1897, the nests in this instance being placed on the tops of broken down bushes. Mr. Tom Carter informs me that it is very abundant at Point Cloates, North-western Australia, and it used to breed on the tops of low bushes on Fraser's Island every season, where he has collected a great number of their eggs for household purposes, between the 18th and 30th July. Much further to the north, and opposite King Sound, North-western Australia, Mr. J. Walker, R.N. of H.M.S. "Penguin," found this species breeding on Adèle Island on the 2nd May, 1891.

In the "Catalogue of Birds in the British Museum" Mr. W. R. Ogilvie-Grant had only a skin of a single adult male for description. It was obtained during the Voyage of H.M.S. "Herald," at Freycinet's Harbour, Shark Bay, Western Australia. Apparently it is a small specimen, the wing and tail-measurement being recorded respectively as 10.8 and 4.7 inches. In a number of specimens in the Australian Museum Collection the wing-measurement varies from 11.5 to 12 inches, and the tail from 6 to 7 inches.

From the Reedbeds, near Adelaide, Mr. W. White wrote me as follows under date 14th June, 1894:—"I found *Phalacrocorax hypoleucus* breeding on a small island in Nepean Bay, Kangaroo Island. It has a decided preference for placing its nest, composed of salt-bush sticks, on top of that bush where it is possible to do so, and to nest as close together as circumstances will allow. In many instances it builds one nest on top of the other until they are eighteen inches high, and continue to build on the old nests until they capsize them; they then build on the heap of ruins, placing a very little seaweed or small sticks in the centre, in some instances barely enough to put the eggs on, the outer sticks being well matted together with filth. Although they are surrounded with salt-bush three feet high, they do not go out of their nesting boundary, but pull the sticks for building each season from the nearest bush, forming almost a

bare place round their nesting colony. To the seaward side, and in bare places in the nesting colony where there was no salt-bush for them to build on, were nests of *Phalacrocorax stictocephalus* on the ground, formed with seaweed lined with finer weed, moderately deep and cosy. This bird is much more shy than *P. varius*, and much fewer in number."

From Blackwood, South Australia, Mr. Edwin Ashby sends me the following note: - "*Phalacrocorax hypoleucus* breeds in large numbers on what is known as the 'Spit,' near Kingscote, Kangaroo Island, South Australia. I have seen the eggs in numbers in March. The nests are masses of rubbish piled on low shrubs one foot high, locally known as saltbush. This is, I think, the commonest species of all this genus on the sea coast round South Australia."

Writing from Port Augusta, South Australia, on the 11th August, 1901, Dr. A. Cheney remarks: - "During a trip down Spencer's Gulf last May, I found a breeding place of *Phalacrocorax hypoleucus*. They build in the mangroves in colonies, and nests may be seen by the dozen in small areas of about an acre in extent."

With two eggs received in exchange by the Trustees of the Australian Museum from Mr. W. J. Mellor, the following note was received: - "These eggs were taken on the 24th May, 1875, by the late Mr. Samuel White, who died in Sydney some years ago. The notes in his handwriting are as follows: "On a sand-spit in the Bay of Shoals, at Kingscote, Kangaroo Island. The place is grown over with bushes and the birds were in thousands, although the breeding season was nearly over, there being only about forty nests with eggs, but the young birds covered an acre of ground as thick as they could stand. Their nests as usual were made of a few sticks placed close together on the bushes that had been trodden down. I took about twenty eggs, the clutches being from two to four eggs."

Writing on the Bird Life of Adèle Island, North-western Australia, in "The Ibis,"* Mr. James Walker, R.N. of H.M. Surveying Ship "Penguin," remarks: - "Among some *Sida* bushes not far from the centre of the island was a breeding colony of Black and White Cormorants, *Phalacrocorax varius* (Gmelin). The nests were rudely constructed of small twigs, and were built on the boughs of the *Sida*, about three feet from the ground. Each contained, in a very slightly depressed hollow, three long oval eggs of a pale bluish-green colour, with a very thick and rough chalky coating. Numerous dead fish, some of quite large size, were strewn about here, and the aroma of the whole place was decidedly more pungent than agreeable. The birds themselves were somewhat shy, and did not admit of a very near approach before taking wing."

The eggs are usually two or three in number for a sitting, elongate-oval in form, of a uniform pale bluish-white, which is more or less obscured by a coating of lime. Two eggs in the Australian Museum Collection, taken by the late Mr. Samuel White, measure:—Length (A) 2.27 × 1.37 inches; (B) 2.25 × 1.52 inches. Mr. Otto Lipfert, a collector of the Perth Museum, Western Australia, found this species breeding on Middle Island, and on a reef jutting out from Rat Island, Houtman's Abrolhos, Western Australia, on the 7th November, 1894. A set of three in the Australian Museum Collection, received in exchange from the Perth Museum, measures as follows:—Length (A) 2.32 × 1.59 inches; (B) 2.27 × 1.48 inches; (C) 2.47 × 1.55 inches. A set of two taken by Mr. W. White in July, 1893, on a small island in Nepean Bay, on the eastern side of Kangaroo Island, South Australia, measures:—Length (A) 2.24 × 1.47 inches; (B) 2.27 × 1.48 inches. A set of two taken in the same locality measures:—Length (A) 2.37 × 1.51 inches; (B) 2.31 × 1.46 inches.

Apparently there are two breeding seasons in the year, the late Mr. S. White taking eggs on Kangaroo Island, South Australia, in May, Mr. W. White in July, October and November, and Mr. J. H. Mellor in January. In Western Australia Mr. O. Lipfert took eggs on Middle and Rat Islands, Houtman's Abrolhos, in November, Mr. Tom Carter procured eggs on Fraser's Island in July, and Mr. J. Walker, R.N., found eggs and young on Adèle Island in May.

* Ibis, 1892, p. 258.

EXPLANATION OF PLATE A. 15.

“ Fred,” a Nymboidia Aboriginal, at a nesting-place of the Black-cheeked Falcon (*Falco melanogenys*). The eggs, three in number, were taken from the ledge on which he stands. Reproduced from a photograph taken by Mr. George Savidge, of Copmanhurst, New South Wales.



EXPLANATION OF PLATE B. XVI.

- Fig. 1. FALCO MELANOGENYS.
Black-cheeked Falcon.
- Fig. 2. FALCO SUBNIGER.
Black Falcon.
- Fig. 3. FALCO HYPOLEUCUS.
Grey Falcon.
- Figs. 4, 5. HIERACIDEA ORIENTALIS.
Brown Hawk.
- Fig. 6. HIERACIDEA BERIGORA.
White-breasted Hawk.
- Figs. 7, 8. FALCO LUNULATUS.
White-fronted Falcon.
- Figs. 9, 10. ELANUS AXILLARIS.
Black-shouldered Kite.
- Figs. 11, 12. CERCHNEIS CENCHROIDES.
Nankeen Kestrel.



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PART V. of Volume III. is issued herewith. It contains the remainder of the Family PHALACROCORACIDÆ and the Families SULIDÆ, FREGATIDÆ, PHÆTHONTIDÆ and PELICANIDÆ of the Order STEGANOPODIS.

R. ETHERIDGE, JUNR.,

CURATOR.

AUSTRALIAN MUSEUM, SYDNEY.

16th September, 1912.

Phalacrocorax melanoleucus.

LITTLE BLACK AND WHITE CORMORANT.

Hydrocorax melanoleucus, Vieill., Nouv. Dict. d'Hist. Nat., Tom. VIII., p. 88 (1817).

Phalacrocorax melanoleucus, Gould, Bds. Austr., fol. Vol. VII., pl. 70 (1818); *id.*, Handbk. Bds. Austr., Vol. II., p. 193 (1865); Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 398 (1898).

ADULT MALE (in breeding plumage).—*Forehead, crown of the head, back of the neck, also sides of the lower neck, back, flanks, rump and upper tail-coverts black with a slight greenish gloss; upper wing-coverts and scapulars glossy greyish-black, with black margins; quills black; tail feathers black with a slight purplish gloss; sides of head, neck and all the under surface and under tail-coverts pure white; bill dark horn colour, sides of upper mandible and entire under mandible yellow; legs and feet black; bare skin around and in front of the eye yellow; iris dark brown. Total length in the flesh 24 inches, wing 8.75 tail 6, bill 1.15, tarsus 1.45.*

ADULT FEMALE (in breeding plumage).—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia.

THE Little Black and White Cormorant is abundantly distributed, in favourable situations, over the greater portion of the Australian Continent and Tasmania. It is likewise found in New Zealand and the Islands of Torres Strait. Count Salvadori also records it from New Guinea, New Caledonia, the Pelew and Aru Islands, Ternate, Celebes and Timor. It frequents the bays and inlets of the coast, as well as the rivers and lakes of the interior, and is far more common in the far inland waters than any of the preceding species. Near Sydney it may frequently be met with in the dams and ornamental waters of Centennial Park, and occasionally also in the far more circumscribed waters of the Botanic Gardens. It is usually abundant on the shores of Narrabeen Lake, Middle Harbour, and Botany Bay; also on the Parramatta and Cook Rivers. Gould remarks that the shyness of its disposition renders it very difficult of approach, particularly if its natural timidity has been increased by the discharge of a gun. Familiarity has, however, in many instances, rendered it very bold in some districts around Sydney. I have known this species clean out several pools stocked with fish, and at Chatswood to descend into a well filled clay hole in a deserted brick-yard, surrounded with houses, and close to a leading thoroughfare, to obtain the introduced carp. A specimen obtained at Cook River had the stomach crammed full with prawns. In habits, otherwise, it resembles the other members of the genus. The Little Black and White Cormorant or "Shag" used to be very numerous in the Tea-trees bordering the eastern side of the ornamental lake in the Botanic Gardens, Melbourne, a peculiar effect being produced about sunset by the birds all being perched one way, with their silvery-white breasts facing the setting sun. This place, in my early collecting days, was a great resort of waterfowl of many species, but principally Nankeen Night Herons, Ducks, Cormorants, Pelicans and Coots.

From Bimbi, Duaringa, Queensland, Mr. H. G. Barnard sends me the following note:—
"The Little Cormorant (*Phalacrocorax melanoleucus*) breeds in the spring and autumn, whenever the swamps are full. The nests are placed on small trees growing in the water, and are composed of sticks and small green branches, broken from the trees on which the nests are built. These birds breed in companies, as many as ten nests being built on one tree; some of the nests are placed within a few feet of the water, others again being as much as thirty feet up. They lay from three to five eggs, generally three."

Mr. Henry R. Elvery writes me as follows from Alstonville, Richmond River, New South Wales:—"I observed a large rookery of *Phalacrocorax melanoleucus* on Stony Island, Tuckiana Swamp, Richmond River, on 8th November, 1899. The birds were breeding in company with *Herodias alba*. The nests contained from three to five eggs, and incubation was well advanced."

From Copmanhurst, Upper Clarence River, New South Wales, Mr. George Savidge writes me:—"The Little Black and White Cormorant (*Phalacrocorax melanoleucus*) is the smallest species inhabiting the Clarence River. It may be seen in all parts wherever swamps, lagoons or creeks exist. It is plentifully dispersed in the reaches of the Upper Clarence, where I have found small colonies breeding upon several occasions: also in that stretch of water between Grafton and Copmanhurst, where steamer traffic passes by daily. It constructs its nest on the Tea-trees that overhang the banks of the river, and it is a loose clumsy structure formed of small sticks, bark and leaves. The colonies I found consisted of from three to a dozen nests, and the eggs are laid during September, October and November. Three to five eggs are usually laid for a sitting."

From Melbourne, Victoria, Mr. G. A. Kearthland writes me:—"I have shot Little Black and White Cormorants (*Phalacrocorax melanoleucus*) on the Yarra, on lagoons at Heidelberg, in Hobson's Bay, at Port Melbourne, and on the Fitzroy River, West Kimberley, North-western Australia. At the latter place I saw a number of trees containing the nests from which the young Cormorants had just flown. The immense amount of white excreta on the branches and ground caused the place to look as if the whole had been lime washed."

While resident at Hamilton, in the Western District of Victoria, Dr. W. Macgillivray sent me the following notes:—"In company with Mr. C. Seymou, another naturalist, and Mr. Brommel of Hensley Park, on the 4th November, 1900, we visited a dam about fourteen miles from Hamilton, on Mohanger Station. The nests of *Phalacrocorax melanoleucus* on one tree, standing in about three feet of water, were about two hundred in number, being on all parts of it, each about one foot or less in diameter, composed of Gum twigs and leaves, the leaves drooping down from the sides, and were somewhat flat on top. They contained young at all stages of growth and eggs from fresh to all degrees of incubation; the clutches varied from four to seven, the usual clutch being five, but no nest contained more than three young birds. Most of the fully, and many of the partially, feathered young, on our approach clambered out of their nests and dropped into the water below, and curiously enough, although they were dropping all around us, we did not see a single one come to the surface, and they certainly were not drowned, they disappeared at once, and were not seen again during the two hours or more that we spent there. Many young Shags were seen hanging by their necks dead amongst the branches. Near the top of the tree was an old Whistling Eagle's nest, with two nests of the Spotted-sided Finch under it. The Eagle's nest contained a Shag's nest and eggs."

Mr. W. White, of the Reedbeds near Adelaide, South Australia, wrote me as follows under date 17th May, 1894:—"I have just returned from a trip among the Cormorants at Nepean Bay. I was late this season, as there were hundreds of four species of young ones of all sizes, from just hatching to those able to fly. However, being a little late turned out to be an advantage, as it better enabled me to distinguish the different species. It was interesting to see the nest of *Phalacrocorax melanoleucus*, with its silver-breasted, small pointed head and thin-necked young, adjoining the nest of *P. nova-hollandiæ*, with its black, woolly booby-headed young. They seem to be on the best of terms with each other; many of them came and fed their young within a few feet of me, and it was wonderful to see the sized fish that would go down that little silvery throat. The Black Cormorant was much more shy than the Little White-breasted species. I also took many eggs from nests which contained young. It was interesting to me to find that the Cormorant does not eat dead fish, as in their zeal to fatten their offspring they brought fish much too large to go down the gullets of the very young, such as flathead, a bulky fish, nine

inches long, and others twelve inches in length. These, with other fish matter lying about the nests, are removed every day by scavengers in the form of a host of Silver Gulls, who seem to be just as much at home among the nests and young ones as the Cormorants themselves. This clearing away daily of the surplus fish must minimise the odour, which is bad enough as it is."

Mr. R. N. Atkinson writes me from Tasmania:—"I found a small colony of Little Black and White Cormorants (*Phalacrocorax melanoleucus*) breeding on Flinders Island, Bass Strait, on the 20th October, 1909. The nests were placed in the branches of low Tea-trees, as were those of *P. novæ-hollandiæ*, in whose company these birds were breeding, the material used being small twigs, with a lining of fine twigs and young shoots of some soft dry shrub. There was a slight variation in size, but a typical nest measured—outside diameter fourteen inches, inside seven inches by two and a half inches deep. The eggs were four or five in number, from fresh to hard set. The birds left the nests on my approach, and together with the larger species described wide circles overhead until I had disappeared."

Inland this species breeds in Tea-tree swamps, also in Gum-trees overhanging rivers and creeks, and for preference in those standing in flooded country or in back waters, several nests frequently being built in the same tree, and often in company with other species. The nest is a comparatively small and nearly flat stick-formed structure, and usually lined with Eucalyptus leaves.

The eggs are usually four or five in number for a sitting, but six or seven are sometimes found; they are oval or elongate-oval in form, or lengthened ellipses, pointed at one end, often occur, of a uniform pale bluish-white, which is more or less obscured with a coating of lime, and vary considerably in size. A set of five in the Australian Museum Collection, taken at Ulmarra, Clarence River, New South Wales, measures:—Length (A) 1.93 × 1.23 inches; (B) 1.84 × 1.33 inches; (C) 1.76 × 1.23 inches; (D) 1.8 × 1.18 inches; (E) 1.85 × 1.22 inches. Another set of five in the above Collection, taken at Lake Buloke, near Donald, in North-western Victoria, measures:—Length (A) 1.8 × 1.25 inches; (B) 1.82 × 1.3 inches; (C) 1.82 × 1.22 inches; (D) 1.8 × 1.3 inches; (E) 1.98 × 1.35 inches. Another set of five taken in the same locality measures:—Length (A) 1.9 × 1.21 inches; (B) 1.8 × 1.21 inches; (C) 1.77 × 1.23 inches; (D) 1.75 × 1.2 inches; (E) 1.8 × 1.21 inches. A set of four taken at Coomoolaroo, Duaringa, Queensland, by Mr. H. G. Barnard, on the 10th October, 1903, measures:—Length (A) 2.07 × 1.28 inches; (B) 1.89 × 1.2 inches; (C) 2.05 × 1.25 inches; (D) 2 × 1.27 inches. A set of four taken near Booligal, Lachlan River, South-western New South Wales, measures:—Length (A) 1.93 × 1.25 inches; (B) 1.94 × 1.22 inches; (C) 1.9 × 1.25 inches; (D) 1.94 × 1.26 inches.

There is apparently no fixed breeding season, although nests with eggs are more common in October and November.

Sub-family PLOTINÆ.

Genus PLOTUS, *Linnaus*.

Plotus novæ-hollandiæ.

DARTER.

Plotus novæ-hollandiæ, Gould, Proc. Zool. Soc., 1847, p. 34; *id.*, Bds. Austr., fol., Vol. VII., pl. 75 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 496 (1865); Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 417 (1898); Sharpe, Hand-l. Bds., Vol. I., p. 236 (1899).

ADULT MALE.—*General colour black, the under parts slightly more glossy than the upper: quills black; upper wing-coverts black broadly streaked with silvery-white, the scapulars similar but narrowly centred with silvery-grey; tail black; lower part of neck and upper back black, the margins of the*

feathers on the latter pale brown; remainder of neck and head brown, russet brown on the front of the neck, darker brown on the crown of the head and hind-neck; a white stripe extends below each eye on to the sides of the neck, wide in the centre but narrow at each end; a similar stripe commences at the base of the lower mandible, and joins the white margin of feathers bordering the skin of the throat; bill olive-brown, cutting edge of upper mandible and entire under mandible yellow; bare skin of throat and around the eye yellow; legs and feet fleshy-yellow. Total length in the flesh .55 inches, wing 1.38, tail .9, bill 2.9, tarsus 1.65.

ADULT FEMALE.—General colour above brown, the centres of the feathers on the crown of the head, hind-neck and upper back dark brown; scapulars blackish-brown with a narrow lanceolate stripe of silvery-white down the centre and margined with pale brown or whitish-brown; lesser upper wing-coverts whitish, the remainder blackish-brown with a broad stripe of silvery-grey down the centre; quills black, the innermost secondaries broadly streaked with silvery-grey; tail-feathers black; all the under surface and under tail-coverts white, the fore-neck washed with brown; flanks blackish-brown. Total length in the flesh .58 inches, wing 1.3, tail .9, bill 2.9, tarsus 1.65.

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Western Australia.



DARTER.

THE genus *Plotus* is almost cosmopolitan, occurring in Asia, Africa, tropical and subtropical America, the Malay Archipelago, New Guinea and Australia. The present species is generally distributed, in favourable situations over the Australian Continent, and is likewise found in the southern parts of New Guinea. In the Australian Museum Collection are specimens from the latter island and all the States. Unlike the different species of Cormorants, it does not frequent the rocky islets around the coast, although it may be found in the sheltered bays and inlets of the coast-line. It evinces a decided preference for the more placid

lakes, rivers and lagoons inland, situations that afford it an abundant supply of food, for which its sinuous snake-like neck and long sharp-pointed bill is well adapted for the purpose of securing its finny prey; aquatic insects, and small reptiles also constitute portion of its food. While undoubtedly at home on, or in the water, for usually the greater part of its body is submerged, when paddling about in search of food, it often remains perched erect and motionless, with half-opened wings, on the bough of some lofty tree. A favourite perch for this bird is a snag about a foot or two above water, where crouched low down it may secure any passing fish. When disturbed by too near an approach, the Darter gently slides off its perch and disappears, often without a splash or ripple, and appears generally some twenty or thirty yards away.

The transverse ribbing of the innermost secondaries and central tail-feathers is more marked in some specimens than others, and at all times is more pronounced in the male than the female. Much has been written of the peculiar kink in the neck of the Darter, and is thus referred to by

the late Mr. W. A. Forbes, Prosector of the Zoological Society of London:— “Professor Garrod has fully and accurately described the peculiar osteological character of the neck of the Darter. But probably from never having observed these birds when feeding, he has not pointed out the connection between this peculiar neck, with its naturally persistent kink, of the Darters and their mode of life.

“The Darters feed entirely, so far as I have been able to observe, under water. Swimming with its wings half expanded, though locomotion is effected entirely by the feet, the bird pursues his prey (small fishes) with a peculiar ‘darting’ or jerky action of the head and neck, which may be compared to that of a man poising a spear or harpoon before throwing it. Arrived within striking distance, the Darter suddenly transfixes, in fact bayonets, the fish on the tip of its beak with marvellous dexterity, and then immediately comes to the surface, where the fish is shaken off the beak by jerking the head and neck, repeated till successfully thrown upwards, and swallowed usually head first. A study of the neck in a recently dead bird, leaves little doubt as to the mechanism by which the peculiar impaling of the prey is effected. The eighth cervical vertebra is articulated with the seventh in such a way that the two cannot naturally be got to lie in the same line, but form an angle, open forwards, of about 145° , when the two bones are stretched as far as is possible in that direction. Behind, its articulation with the ninth cervical is such as to permit it to be bent back at an angle a little greater than 90° with that vertebra, beyond which extent, however, no further flexion is possible. . . . When the neck is bent in this Z-shaped form, any opening out of anterior angular bend by the action of the anterior neck muscles, causes the anterior moiety of the neck to suddenly shoot out, thus causing a corresponding protrusion of the head and beak. . . . This protrusion, though only for a short distance, is so violent as to effectually ‘strike’ the fish which the bird is pursuing. . . .

“It is obvious that considerable advantage is gained by the action in question, the rapid protrusion of the narrow neck and head over a small space by this mechanism necessitating a less amount of exertion than would a similar movement of the whole bird over the same space, and being equally efficacious in striking the prey. The whole mechanism, it may be observed, exists in a less developed form in the neck of the Herons, Cormorants, &c., and it requires but a slight modification of the arrangement of these parts in those birds—none of which, so far as I know, impale their prey like the Darters—to bring about the perfect adaptation of these structures to a newly acquired mode of feeding.”

Of the fish-eating propensities of the different species of the genus *Plotus*, Audubon, writing of *Plotus anhinga* of tropical and sub-tropical America, remarks of one in confinement:— “One morning I gave it a black fish measuring nine and a half inches in length by two inches in diameter, and although the head of the fish was considerably larger than its body, and its strong and spinous fins appeared formidable, the bird, which was then about seven months old, swallowed it entire head foremost. It was in appearance digested in an hour and a half, when the bird swallowed three others of somewhat smaller size. At another time we placed before it a number of fishes about seven and a half inches long, of which it swallowed nine in succession. It would devour at a meal forty or more fishes about three inches and a half long. On several occasions it was fed on plaice, when it swallowed some that were four inches broad, extending its throat and compressing them during their descent into the stomach.”

The present species is found, although it is by no means common, in the neighbourhood of Sydney, a fine plumaged old male in the Australian Museum Collection having been procured at Lake Narrabeen. In New South Wales I have, however, noted it commoner in the Upper Clarence, Tweed and Gwydir Rivers.

From Copmanhurst, Upper Clarence River, New South Wales, Mr. George Savidge sends me the following note:—“*Plotus novæ-hollandiæ*, locally called the Snake-necked Darter, is found

* Proc. Zool. Soc., 1882, pp. 210-12.

in pairs and small flocks along the course of the Clarence River. It shows a decided preference for fresh water, and I do not remember ever having observed it at Yamba, the entrance to the Clarence River, but I have observed it singly in small isolated lagoons and waterholes some distance from the main river. I have found it breeding upon several occasions, and it may often be seen in the same tree as the Little Black and White Cormorant: sometimes it breeds singly, and shows a decided preference for the Oaks and Tea-trees overhanging the water. The largest colony I visited was at the back of Ulmarra, where seven of these birds had constructed their nests in the Swamp Oaks that border the creek, the height from the ground varying from twelve to thirty feet. The nest is made of sticks and twigs lined with leaves. I think three eggs is the usual number laid, but some nests contained two eggs only, and upon two or three occasions I have found five. If one or two eggs are taken from the nest they do not desert it as other birds frequently do, but keep on laying until the full set is deposited. Both birds sit, and during the breeding season their grating call may be heard a long distance away. From the banks of the Clarence, at Copmanhurst, when the water has been very clear, I have watched them very plainly diving and catching fish with ease, and it can move through the water with great rapidity. In September, 1909, I saw seven, all males, about a mile below Copmanhurst Wharf, and when disturbed they mounted high in the air and circled round for some time, eventually making south-east. I watched them as far as the eye could see: had these birds left the females sitting, or were they the advance guard on the look out for some new nesting site, where they would not be disturbed?"

The nests of the "Snake-bird" or Darter are large, open and nearly flat but thick bulky structures, formed of sticks, twigs and leaves, the saucer-shaped depression being usually lined with the latter material, an average nest measuring in external diameter sixteen and a half inches by twelve inches in depth, and are usually placed at the junction of several pronged nearly upright or horizontal branches of a *Casuarina*, *Eucalyptus* or *Melaleuca*, at a height ranging from a few feet to fifty or sixty feet in altitude; many nests are often built in the same tree, frequently in trees standing in flood waters, or on the margin of a river or swamp overhanging water.

The eggs are three to five in number for a sitting, elongated ovals in form, in some specimens tapering more sharply towards the smaller end: the shell is thickly coated with lime, and usually has a few scratches here and there revealing the true colour underneath, which is of a very pale blue or greenish-white. Four eggs of a set of five in the Australian Museum Collection, taken by Mr. J. L. Ayres on the 1st April, 1891, at Lake Buloke, near Donald, in the Wimmera District, North-western Victoria, measures:—Length (A) 2.41 × 1.45 inches; (B) 2.31 × 1.42 inches; (C) 2.34 × 1.45 inches; (D) 2.43 × 1.47 inches. Another nest found on the same day contained five recently hatched young. A set of five in the collection, taken near Ulmarra, on the Clarence River, New South Wales, measures:—Length (A) 2.24 × 1.43 inches; (B) 2.29 × 1.46 inches; (C) 2.47 × 1.52 inches; (D) 2.42 × 1.48 inches; (E) 2.27 × 1.5 inches. A set of three eggs in Mr. Thos. P. Austin's collection, taken on Dunk Island, Queensland, in November, 1898, measures:—Length (A and B alike) 2.27 × 1.47 inches; (C) 2.3 × 1.45 inches. Another set of three taken by Mr. H. Neilson, at Thompson Creek, Queensland, on the 19th April, 1908, measures:—(A) 2.26 × 1.37 inches; (B) 2.25 × 1.4 inches; (C) 2.4 × 1.42 inches. A set of three taken on the Daly River, in the Northern Territory of South Australia, on the 7th June, 1902, measures:—Length (A) 2.29 × 1.43 inches; (B) 2.3 × 1.43 inches; (C) 2.33 × 1.47 inches.

The figure represents an adult male.

GoULD records that the late Mr. Elsey found the Darter breeding on the Victoria River, in the Northern Territory of South Australia, during February and March, laying three or four

eggs for a sitting, and that Mr. Elsey got as many as forty to fifty eggs in a single tree, and many fine meals were made by him off these eggs. I have seen eggs that were taken on the Daly River in June.

Mr. George Savidge found this species breeding on the Upper Clarence River, New South Wales in November, and I saw a number of sets of eggs that were taken on Yanga Lake, in the south-western portion of the State, in the same month. In Victoria Mr. J. L. Ayres found these birds breeding in flooded country in April, their breeding at this time in South-eastern Australia being doubtless influenced by the falls of rain, for usually the breeding season in this part of the continent is more regular during the latter quarter, or very early months of the year.

Family SULIDÆ.

Genus SULA. *Brissou.*

Sula serrator.

GANNET.

Sula australis, Gould (*see* Steph.), Proc. Zool. Soc., 1840, p. 177; *id.*, Bds. Austr., fol. Vol. VII., pl. 76 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 504 (1865).

Sula serrator, Gray, Voy. Erebus and Terror, Birds, p. 19 (1845); Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 428 (1898); Sharpe, Handl. Bds, Vol. I., p. 236 (1899).

ADULT MALE.—*General colour above and below pure white; quills brownish-black, their shafts white at the base, brown on the centre, black at the tips; four central tail-feathers brownish-black with white bases, their shafts white except near the tip, the lateral ones and their shafts pure white; crown and sides of the head and hind-neck ochraceous-buff; bill whitish-horn colour, cutting edge dull blue; skin at base of bill dark lead colour; skin around the eye lavender-blue; iris pale yellow; tarsi and feet brown, the front of them and of the toes pale yellowish-green; nails dull bluish-white. Total length in the flesh 34 inches, wing 18.5, tail 8.5, bill 3.6, tarsus 2.3.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—Coasts of Queensland, New South Wales, Victoria, South Australia, Western Australia, Islands of Bass Strait, Tasmania and adjacent islands.

THE range of the common Gannet or "Booby" of the eastern and southern coasts of Australia, extends as far north in Queensland, according to Dr. E. P. Ramsay, as Cardwell. I have noted it all along the coast of New South Wales, and on the Tasman Sea, Eastern Bass Strait and Tasmanian waters during the forty-eight hours voyage from Sydney to Hobart. Dr. W. Macgillivray found it breeding with other species on Lawrence Rocks, about five miles from Portland, in Southern Victoria, its range extending to South and Western Australian waters, and Mr. Tom Carter informs me that at Point Cloates, North-western Australia, a specimen in a fresh condition was found dead on the beach on the 30th September, 1901. Undoubtedly one of the largest breeding colonies of these birds is on Cat Island, in the Furneaux Group, Bass Strait, near the Tasmanian coast.

It is not known to breed on any of the islands lying off the New South Wales coast, but it is a species that may be seen, although not in great numbers, at all seasons of the year, including the late spring and summer months, a period when the breeding season is at its full height on the islands off the Tasmanian coast. Occasionally it may be seen just inside Sydney Heads, and there are specimens in the Australian Museum Collection captured at Rose Bay and

Watson Bay, and across the narrow peninsula on the ocean side, on Bondi Beach. On several occasions I have seen it venture much higher up the harbour, and once saw one at the entrance to Lane Cove River. Dr. Chisholm Ross also presented a specimen obtained at Newcastle, and Mr. J. Cattle an immature male from Port Hacking. Very often when fishing it flies at some distance from the beach, and follows the outline of the coast. Suddenly it plunges headlong, and drops like a stone into the sea, the spray rising up all round it, secures a fish, which it immediately swallows, and then continues its journey, rarely altering its course.

Much has been written about the natural stupidity of these birds, even when not engaged in family cares, in allowing an intruder to approach and knock them down with a stick, or even capture them by hand. Gould gives an instance in his work on the "Birds of Australia." However simple and confiding these birds may be on land, where they are seldom interfered with, while on the wing I can vouch they almost invariably keep at a safe distance. The late Mr. H. Newcombe obtained an immature male at Kurnell, Botany Bay, on the 1st June, 1902, and an adult male procured at Rose Bay, Sydney Harbour, on the 23rd November, 1909, had a number of bush ticks on the webs of the toes, these insects abounding on the Lantana bushes. Mr. Joseph Gabriel with the late Mr. H. P. C. Ashworth, who were members of a small party of the Field Naturalist's Club of Victoria, who visited the Furneaux Group, at the eastern entrance of Bass Strait, in November, 1893, has kindly sent me the following notes illustrative of Mr. H. P. C. Ashworth's photograph of a nesting colony of *Sula serrator*, which is reproduced on Plate A. 16:—"To the east of Flinders Island, the principal island of the Furneaux Group, lies Babel, Cat and Storehouse Islands, and Cat Island contains a splendid rookery of *Sula serrator*. At the time of our visit this rookery contained about two thousand five hundred birds sitting on their nests, a fine sight to us naturalists. We measured the ground by stepping round, leaving a safe latitude between birds' beaks and legs, the distance being one hundred and fifty two yards, thus giving a diameter of about forty nine yards. The birds in places were in symmetrical rows and about thirty inches apart, with occasional breaks. Of course the above estimated number only represented one half of the birds, as their mates were out after food. It was a pretty sight to see the mates returning from sea, and after an affectionate greeting of kissing and caressing they would eject from their throats the fish for those sitting, some of which measured over a foot in length. The nests were built on slightly raised mounds of clay and guano, and were composed of twigs, algae and polyzoa; each nest contained one egg. We found the birds had been at work for some time, there being several stages of growth of young. When covered with down the birds look very handsome. In taking a few eggs we chose the cleanest looking, and found them, with few exceptions, fresh. The birds fiercely defended the eggs, more so than the young, and I had to shield my legs with a bucket and fish basket. Promenading round the rookery, and sometimes through the rows, were to be seen those impudent scavengers the Silver and Pacific Gulls, picking up the stray pieces of fish left by the Gannets. We found a large heap of guano lying near the shore, gathered ready to ship away; there was a cart track to the rookery, also a few planks among the birds, so they must have to rebuild their nests if this guano is taken away. The heap which we saw had been lying there for some years so the boatman told us. This rookery is likely to be here for some time, few people visiting the locality, as the coast is so dangerous. There is another and much larger rookery on Pyramid Rock, outlying Albatross Rock about fifteen miles, but no naturalist has visited this yet."

While resident at Hamilton, in the Western District of Victoria, Dr. W. Macgillivray kindly sent me the following notes:—"On the 12th November, 1900, I went to Portland purposely to investigate the bird life on the Lawrence Rocks; these are two in number, about a mile east from Cape Sir W. Grant, between which and the nearest rock are several reefs. By boat from Portland, the only practicable route, the distance is about five miles; landing is only possible

on a fairly calm day, and these are few and far between, as the slightest breeze from off the sea sends the breakers thundering over the rocky base of the islands; this we found to be the case on approaching them, and we had perforce to abandon all hope of landing, and content ourselves with a longing glance at the Gannets (*Sula serrator*) circling round the top of the rock, and the Cormorants (*Phalacrocorax leucogaster*) perched on the lower part of the islet. Three weeks later we essayed the task again, and were successful in landing on the southern side of the rocks, on a kind of platform, from which several of the party not interested in birds made a good haul of fish. To reach the Gannets we had to climb over the eastern end of the further and larger island, on which alone many birds breed, descend again to the water's edge, on to a flat mass of rock, usually covered at high tide, and then climb up on to the middle of the main rock, which is hollow and rises to either end, the one nearest the land being covered with a mass of loose guano several feet in thickness, on which grows masses of *Mesembryanthemum*, affording an excellent nesting ground for *Prion ariel*, *Nectris brevicandus* and *Eudyptula minor*; the first named bird's burrows were in hundreds, each something like a rat hole, but oval in shape, and went in on the slant for about a foot or eighteen inches, containing one egg laid on the bare guano in a rather spacious oval chamber at the end, about twelve inches from side to side and eight inches high; the burrows were mostly started under over-hanging *Mesembryanthemum*, but many were in bare exposed soil. The eggs were all in the same advanced stage of incubation at the time of our visit, and three or four birds which we took from the nests were all males. The Mutton Bird burrows were not numerous, and as every egg was perfectly fresh we concluded that we were early for them.

“There were also a few Penguin nests in the guano, but more were found under the boulders, down near high tide mark; these nests contained either eggs in an advanced stage of incubation, or else young birds, the latter being in the majority, and some being almost fully feathered; most of their nests were made of dry “pigface,” and contained almost invariably two young birds or a pair of eggs. To reach the Gannets we had to climb to the highest part of the rock, at the far end of the island, at a height of about two hundred and fifty feet above the sea, and about one hundred and fifty feet higher than the nesting ground of Prions and Mutton birds. On nearing the top of the rock we could see many sitting birds and others continually flying off and on, several being busy feeding their young; most of them kept to their nests till we were within five or six yards when they all flew off uttering indignant protests at the intrusion. There were about two hundred nests, covering an area of about thirty or forty yards, on the highest and most exposed part. The nests were about a foot or eighteen inches apart, and were all built of kelp, fairly well put together, and with a good cavity in the centre for the egg. Several nests were in course of construction; there were many fresh eggs, but the majority, two-thirds I should say, contained eggs fully incubated, and a few newly hatched young and one or two large ones. Most of the nests contained one egg, but in several were two. After taking specimens and photographs, which unfortunately did not turn out well, we descended to rejoin our companions. The only land bird noted was a Pipit (*Anthus australis*) and a few Welcome Swallows. Some birds seemed to be nesting on the face of the cliff, but not having a glass we were unable to identify them. They were thought to be Gulls (*Larus nova-hollandie*).”

From Victoria Mr. G. A. Keartland wrote me:—“One of the prettiest sights to be seen in Hobson Bay, near Melbourne, is to watch the Gannets (*Sula serrator*) when a shoal of Pilchards or other small fish is near the pier. The Gannets dive into the shoal with such force that the spray rises to a height of about twenty feet, but when the bird rises to the surface it generally has the fish, which it swallows, and then prepares for another dive.” I noted this species myself in the same locality, between St. Kilda and Port Melbourne, in November, 1911.

While resident at Circular Head, on the North-west Coast of Tasmania, Dr. Lonsdale Holden wrote me as follows:—“On the 20th August, 1887, I watched a large flock of Gannets

(*Sula australis*) fishing close to the north-western point of Circular Head Peninsula. It was a fine sight, several hundreds of birds were to be seen following a shoal of fish, and a dozen or more of them might be seen diving at once. The spray they threw up, made the sea seem as if it was lashed by a squall, while close by would be a patch of water white with the birds, who sat swallowing the result of a successful plunge."

Mr. E. D. Atkinson sends me the following notes from Tasmania:—"During a trip to the Furneaux Islands, Bass Strait, in company with Mr. W. J. T. Armstrong, in 1907, we landed on Cat Island, one of the smaller islands of the group, on the 12th November, where we found a large colony of Gannets (*Sula australis*) breeding. The nests, covering roughly an acre on the northern portion of the island, consisted of mounds of excrement nine inches high, placed so close together that many touched each other at the base; the hollow at the top measured eight inches across by two inches deep; a few were thickly lined with seaweed, the eggs, one in each nest (though in one instance I noticed three) were mostly fresh, but in some incubation had commenced, whilst in others a few young birds were hatched. No doubt in the first place the eggs were deposited on the surface of the ground, the mounds having risen through successive seasons to their present dimensions. Occasional visits have been made by the lessee of the island for the purpose of removing the accumulation of guano, after which the formation of the nest mounds is again repeated. There were some thousands of birds about, and the ground was practically covered with their nests. As a rule the birds were tame, and in some instances allowed us to touch them whilst on their nests, offering but slight resistance: hundreds also were flying overhead, uttering their feeble and monotonous notes."

Almost invariably only one egg is laid for a sitting in the large nesting colonies of these birds, on the islands of Bass Strait, but Mr. E. D. Atkinson records finding the unusual number of three eggs in one nest. Typically the egg is elongate oval in form, some specimens being much pointed at the smaller end, of a uniform pale bluish-white colour, but which is usually obscured by a thick coating of lime, and generally much soiled by the feet of the sitting bird. There is the usual variation in size to be found where birds breed together in large numbers, the smaller eggs doubtless being laid by younger birds. An egg in the Australian Museum Collection, taken by Mr. Joseph Gabriel on the 12th November, 1893, from the nesting colony figured, Cat Island, Furneaux Group, Bass Strait, measures:—Length (A) 3·07 × 1·9 inches. Four single eggs, taken from different nests at the same place, measure respectively:—Length (A) 2·98 × 1·47 inches; (B) 2·95 × 1·75 inches; (C) 3·15 × 1·9 inches; (D) 3·07 × 1·83 inches. Two eggs taken by Mr. E. D. Atkinson on the 12th November, 1907, on the same island, measure:—Length (A) 3·21 × 1·85 inches; (B) 3·1 × 1·86 inches.

Immature birds have the under parts white, head and neck white with a buffy wash on the forehead and sides of the head, most of the feathers of the head and neck being conspicuously tipped with dark greyish-brown; feathers of the upper back dark greyish-brown narrowly edged at the tip with white, lower back and wings dark greyish-brown, most of the feathers having a white sagittate marking or tipped with white; upper tail coverts white, with one or more irregular-shaped transverse cross-bars of greyish-brown; tail-feathers dark greyish-brown, their shafts whitish; wing almost equals that of the adult bird 18·25 inches.

October and the three following months constitute the usual breeding season on the islands lying off the Tasmanian and Southern Victorian coasts.

Sula cyanops.

MASKED GANNET.

Dysporus cyanops, Sundevall, Physio. Salls. Tidsk., Vol. I., p. 218, pl. v. (1837).

Sula personata, Gould, Proc. Zool. Soc., 1846, p. 21; *id.*, Bds. Austr., fol. Vol. VII., pl. 77 (1848).

Sula cyanops, Gould, Handbk. Bds. Austr., Vol. II., p. 596 (1865); Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 439 (1898); Sharpe, Hand-l. Bds., Vol. I., p. 237 (1899).

ADULT MALE.—*General colour above and below pure white; primaries and their coverts dark brown; secondaries and greater series of upper wing-coverts brown; tail-feathers brownish-black, with the bases of the central ones white, which have also the shafts white, except at the tip. Total length 34 inches, wing 18, tail 7.5, bill 4.3, tarsus 2.4.*

ADULT FEMALE.—*The sexes are alike in plumage.*

Distribution.—Coasts of North-western Australia, Northern Territory of South Australia, North Queensland, Lord Howe Island, Norfolk Island.

THE Masked Gannet is found throughout the tropical seas of the world. In Australian waters Mr. J. T. Tunney found it breeding in May, 1901, on Bedout Island, opposite the De Grey River, on the North-western Australian coast. Further north Mr. James Walker, R.N., of H.M. Surveying Ship "Penguin," found it breeding in company with other species of sea-birds on Adele Island, lying off the coast from King Sound, on the 2nd May, 1891. To the north-east of Australia it has been found breeding on Raine Islet, and a specimen was obtained by the Chevert Expedition on Bramble Cay. In his "Tabular List of Australian Birds" Dr. E. P. Ramsay has recorded it from various parts of the Queensland coast, also from New South Wales and Victoria, on what authority for the two latter States I know not. Gould's evidence that he once saw it on approaching Sydney Heads, but unfortunately at too great a distance for a successful shot, has not been confirmed by subsequent observers, and is altogether a too slender ground for its admittance into the New South Wales avi-fauna. On the other hand *Sula serratator* is not uncommon about Sydney Heads. About four hundred and twenty miles to the east of it Messrs. Etheridge and party found *S. cyanops* breeding in 1887, and collected specimens on behalf of the Trustees of the Australian Museum, on one of the Admiralty Islets lying off the coast of Lord Howe Island. Subsequently in the same year Mr. E. H. Saunders found it breeding in the same locality, and secured a number of eggs for the Australian Museum. Dr. P. H. Metcalfe, late Resident Medical Officer of Norfolk Island for very many years, found it breeding on the adjacent Philip and Nepean Islands.

In the Report of the Voyage of H.M.S. "Challenger," Messrs. Sclater and Salvin quote Mr. (now Sir) John Murray's, one of the naturalists of the expedition, notes as follows:—" *Sula cyanops*, females, Raine Island. Eyes yellow, skin of the throat black, legs and feet slate colour. Stomach contained fish and cuttlefish. This species was the most abundant of the Sulas at Raine Island. It had its nests on the centre of the island. There were eggs in the nests, which were on the ground, and merely a slight hole in the earth. Eggs of all these three species of *Sula* (*S. leucogaster*, *S. piscator*, *S. cyanops*) were preserved. They are all very much alike. I marked the eggs as they were taken from the nest, and when I saw the birds rise. It was difficult to separate them when a lot of them got together. Sulas were noticed at sea in the Pacific from 18° N. to 17° S., and in the Atlantic from 20° N. to 12° S."

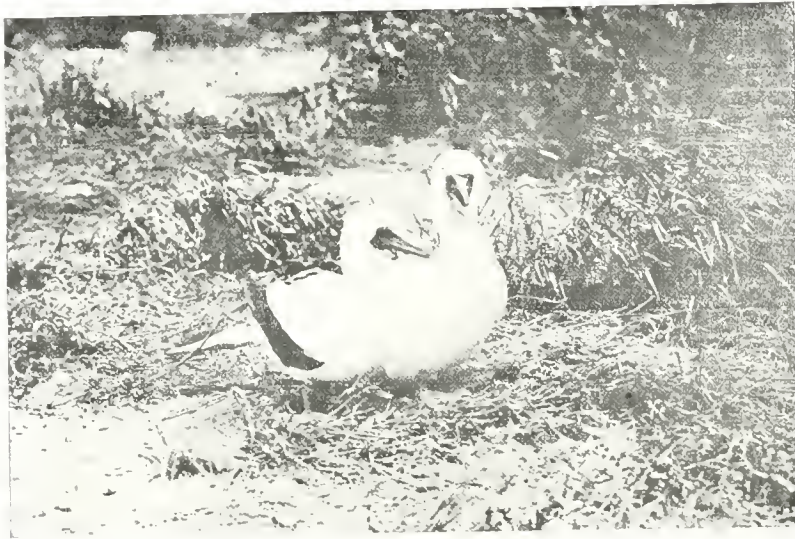
From information supplied by Dr. P. Herbert Metcalfe, late Resident Medical Officer on Norfolk Island, Dr. W. M. Crowfoot wrote as follows of this species in "The Ibis":—"This Gannet breeds on Nepean and Philip Islands, but not on Norfolk Island. It makes no nest.

* Ibis, 1885, p. 267.

except that it sometimes places a few dry grass stalks or rushes under its eggs. As a rule the eggs are laid on the ground, and are usually two in number. This is the only sea-bird breeding on these islands that lays more than one egg. The Gannet commences laying certainly in the earlier part of October, as I have seen a young bird upwards of a week old on the 27th of that month. I have also obtained a fresh egg in the first week in January. The young Gannet is, when fledged, much darker in colour on the wings and back than the parent. The old birds are very tame, and have to be drawn off their eggs, but they peck sharply at intruders with their formidable beaks."

The accompanying figure is reproduced from a photograph taken by Dr. W. Macgillivray on Raine Islet, on the 30th October, 1911.

Mr. R. Etheridge, Curator of the Australian Museum, writing of the General Zoology of Lord Howe Island, during a six week's stay of a party from the Australian Museum in August and September, 1887, remarks:—"The bird inhabiting the Admiralty Islands is *Sula cyanops*,



MASKED GANNET AND YOUNG.

of which we obtained a fine series. On approaching from seaward, the white plumage of this bird renders it a most conspicuous object, presenting to the eye large white dots, scattered in all conceivable positions, over the side of the hill. *S. cyanops* is very stupid, sluggish and easily captured, for when climbing the steep sides of the islet they may be literally walked over before

any attempt on their part is made to waddle off. The eggs are simply laid between tussocks of grass. In Gould's figure of this species the legs and feet are represented as of a peculiar green, and the iris yellow. Every example collected by us had those portions of the body black."

From a very interesting account published in "The Ibis"† of the Bird life of Adèle Island, North-western Australia, by Mr. James Walker, R.N., of H.M.S. "Penguin," and who is well known to most Australian zoologists, I have extracted the following:—"About forty-five miles due north of the entrance of King Sound, North-western Australia, is a little island surrounded by extensive banks of sand and coral, which appears to have been first noticed during the voyage of the French discovery ships 'Géographie' and 'Naturaliste,' in 1801, and named by Baudin Adèle Island. All that seems to be known about the island is that it is of very small extent (about three miles long in a N.N.W. and S.S.E. direction, by about one mile broad), very low, sandy and grassy, frequented by multitudes of sea-birds, and having a small patch of guano near its south-eastern extremity. It being desirable to ascertain the position of this island with as much accuracy as possible, H.M. Surveying Ship 'Penguin,' on the morning of May 2nd, 1891, anchored at about a quarter of a mile from the edge of the surrounding reef, and nearly two miles from the island itself, which at this distance presented a very curious appearance, a long

* Lord Howe Island, p. 10 (1880) † Ibis, 1892, p. 254.

strip of bright yellow sand, surmounted by a straight narrow ribbon of green grass, being all that was visible. . . . The sea-fowl formed by far the predominant and the most interesting part of the population of the island. As we approached it in the ship, the number of birds seen was much greater than had ever before been observed by us in this region, and as we were wading across the reef we could see them hovering over the island in a perfect cloud, the air being filled with their harsh cries. . . . On the beach just above the line of the highest tides, and at intervals of a few yards apart, were little communities of both species of Gannets—the widely-distributed ‘Booby,’ *Sula fiber*, and the fine dark brown and white *S. cyanops* (Sundevall)—engaged in incubation. The two species usually nest separate, though occasionally one or two of one kind would be found in a group of the other, apparently not regarded as intruders. Both birds made very similar rude nests of seaweed, about two feet in diameter, and not exceeding three or four inches in height; but in many cases the eggs were deposited in a mere slight hollow on the sand, without any attempt at a lining. Two eggs were the usual number laid by each bird, those of the *S. cyanops* being as a rule rather larger and more elongate in outline than those of *S. fiber*. Both were of the same greenish-white colour, with a dense white chalky coating. Very many of the nests contained young birds, some hatched only that morning and perfectly naked; others were half the size of the adults, and densely clothed with pure white down. The behaviour of the two birds was strikingly different—the *S. fiber* only giving vent to a feeble croak or two and then scuttling awkwardly off the nest away out to sea, returning, however, in a few minutes. *S. cyanops* on the other hand, made a fierce resistance, biting savagely at a stick presented to it, and uttering a succession of loud harsh croaks, or rather barks, while the bird had to be fairly shoved off the nest before it would quit its eggs or young. All the time hundreds of the Gannets, chiefly of the brown species, were on the wing, sailing overhead with the quietness of Owls, and often coming within two or three yards of me as I strolled along the beach.”

From Broken Hill, South-western New South Wales, Dr. W. Macgillivray wrote:—“I found *Sula cyanops* nesting all over Raine Islet on the 30th October, 1910, next in number to the Brown Gannet, and had eggs, nestlings, and almost fully feathered young birds. Their nesting habits were in every way similar to those of the Brown Gannet, the nests being depressions in sand or soil of about eight to twelve inches in diameter, with a depth of about three or four inches, material being collected round about as incubation proceeded. Fully two-thirds of the eggs examined were in pairs, and as with the Brown Gannet, many of the singles were due to the attention of the Gulls. The nestling, hatched naked, soon gets a covering of white down, the mask being slightly darker than that of the Brown Gannet nestling. The adult bird has the same habit of disgorging fish on being interfered with.”

My experience of the Masked Gannet was gained while at Lord Howe Island. Eagerly had a party of visitors from Sydney scanned the sky and the surrounding seas, intent on visiting one of the Roach Islands or Admiralty Rocks, six in number, lying about two miles from the shore, on the north end of the island. For nearly a fortnight there was intermittent rain and sunshine, and the cloud-capped tops of Mounts Lidgbird and Gower, the latter having an altitude of 2850 feet, were seldom visible. At intervals the winds lashed into huge waves even the usual calm waters within the reef, completely hiding the last remnant of the derelict French frigate ‘La Mearthe,’ and came thundering into long breakers on the beach. On other days the sun shone, and the placid-looking seas were like a sheet of glass, but the water could be seen rising and falling ominously up and down the sides of the Admiralty Rocks, warning the experienced islanders that there was too much of a swell on, and that no boat could land upon them. At last, on the morning of the 15th October, 1910, the welcome news was received to be ready at Ned’s Beach punctually at 10 a.m., as the seas were favourable for making a landing. In addition to the four visitors from Sydney, our party included Mr. Percival R. Pedley, a

well-known resident of Sydney, but who had been staying on Lord Howe Island for the past ten or twelve months, and acted as our photographer. Four sturdy islanders had engaged to row us over to Great Admiralty Rock, a distance of about two miles, and our willing hands assisted them to draw the "Majestic" out of the palm-thatched boat-house and run the boat down to the beach. On our way across the keen eyes of one of the islanders pointed out two large turtles lazily floating just beneath the surface of the water. *Sterna fuliginosa*, which usually kept some thirty or forty feet high when flying over Lord Howe Island, almost brushed against our hats as we neared the islands, and we could see immense numbers of sea-birds hovering above the islands, while comparatively large patches of white near the top of the rock showed that *Sula cyanops* was nesting. Judging the proper time to jump on to the slippery slime-covered rocks, we all effected a landing, with the exception of two islanders, who remained fishing after rowing a little distance away, to prevent the boat being dashed on to the rocks. The island is of volcanic origin, about two-thirds of a mile long, and a quarter of a mile broad at its widest part. In



PORTION OF GREAT ADMIRALTY ROCK, A NESTING HAUNT OF SEA BIRDS.

shape it is like a man's boot with a wide tread at the toe, and turned slightly to the left; this is connected with the rounded and highest part of the island by a narrow but lofty archway. There is a rough and nearly flat plateau of rocks surrounding the island, above which rises a more or less upright weathered wall, with an uneven top, running to the centre of the island, which is plentifully covered with knee high grass tussocks. One of us carried a gun, the two egg collectors each a bucket, with a mattress of palm fibre at the bottom, and the remainder sticks. My first find, just before reaching the grassy top of the island, was the pretty little Grey Noddy (*Procelsterna cinerea*), which is known to the islanders as the "Blue-billy," sitting on a single incubated egg, in a cranny of the weathered face. Gaining the outer grassed topped edge of the island, which gradually rose much higher in the centre, especially towards either end, and which consisted all over of grassy knolls, interspersed here and there with patches of bare earth and rock, it behoved us to walk carefully to prevent treading on a sitting bird, egg or young one. Thousands of birds were hovering in the air above us, and a large number remained sitting, protecting either their young ones or eggs. The birds consisted principally of

Sooty Terns (*Sterna fuscata*), or "Wide-awake," which uttered an incessant "ka-ka," whether flying in the air or turning and twisting as they sat upon an egg or newly hatched young, at the unusual proximity of an intruder. Next in number were the Masked Gannets (*Sula cyanops*). Some had to be lifted off the egg or eggs they were sitting upon, which varied from one to three in number, and all perfectly fresh: some 1 afterwards blew, shewing not the slightest trace of incubation. Some of the birds waddled ungainly off their nest at one's approach, if nest it could be called, for in many instances it consisted of the flat bare soil or rock: others had a slight amount of debris scraped around. The Masked Gannets sat like giants amongst pigmies, for wherever one went on any part of the island it was covered at a distance of a foot or two apart with sitting birds, eggs or young, but the Gannets were more numerous on the higher parts. The Noddy (*Anous stolidus*) was at the time of our visit very rare, only about six pairs being found nesting, and the single egg on which they were sitting, generally near the outer grassed-topped edge of the island, were with two or three exceptions more or less incubated. The accompanying figure, reproduced from a photograph by Mr. Percival R. Pedley, shows only a small portion of the island visited, also some of the smaller islands of the group, with Mounts Lidgbird and Gower on Lord Howe Island in the distance.

The eggs are usually two in number for a sitting, oval or elliptical in form, varying in size, and are of a pale bluish-white ground colour, which is more or less obscured with an irregular coating of lime: after being sat upon for a few days they become soiled with the feet of the sitting bird, and assume a dirty brown hue. Six eggs taken from different nests on one of the Admiralty Rocks measure:—Length (A) 2.47 × 1.84 inches; (B) 2.62 × 1.48 inches; (C) 2.47 × 1.9 inches; (D) 2.65 × 1.81 inches; (E) 2.6 × 1.87 inches; (F) 2.57 × 1.9 inches. An egg taken on Nepean Island, lying off Norfolk Island, on the 23rd October, 1885, measures:—Length 2.62 × 1.82 inches. A set of two taken on the same date measures:—Length (A) 2.55 × 1.9 inches; (B) 2.48 × 1.87 inches. Another set of two taken by Dr. W. Macgillivray on the 30th October, 1910, on Raine Islet, measures:—Length (A) 2.57 × 1.85 inches; (B) 2.53 × 1.70 inches.

On Great Admiralty Rock eggs of the Masked Gannet were found from September to December, Dr. P. H. Metcalfe has taken eggs on Nepean and Phillip Islands from October to January, and has found young birds on the 27th October, while on the outlying islands off the North-eastern Australian coast, nests with eggs were found in April and May.

Sula piscatrix.

RED-LEGGED GANNET.

Pelecanus piscator, Linn., Syst. Nat., Tom. I., p. 217 (1760).

Sula piscator, Gould, Bds. Austr., fol. Vol. VII., pl. 79 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 509 (1865); Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 432 (1898).

Sula piscatrix, Sharpe, Hand-l. Bds., Vol. 1., p. 237 (1899).

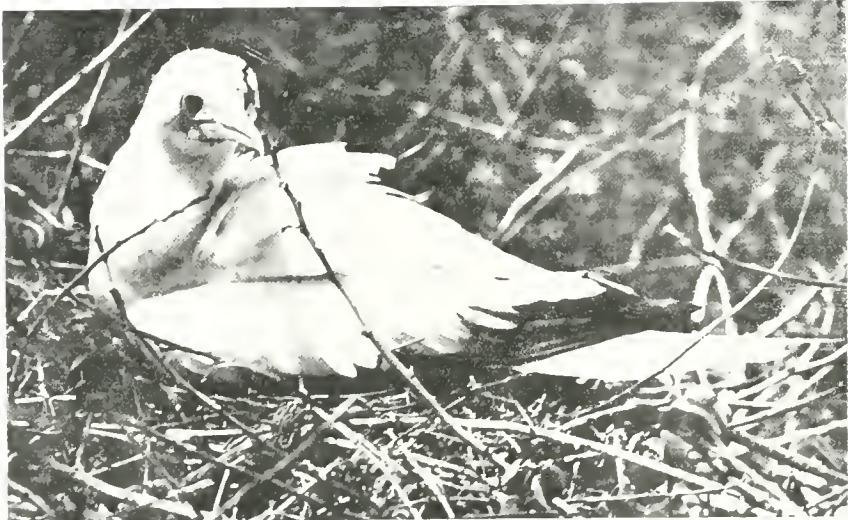
ADULT MALE.—*General colour above and below pure white; outer series of medium and greater upper wing-coverts, the primary coverts, primaries and outer secondaries hoary-grey on the outer webs blackish on the inner. Total length 30 inches, wing 15, tail 9.5, bill 3.5, tarsus 1.5*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—Seas and islands of the Northern Territory of South Australia, islands of Northern and North-eastern Queensland and Torres Strait.

THE Red-legged Gannet is the smallest species of the genus inhabiting the islands and seas of Northern and North-eastern Australia, the islands of Torres Strait, and Raine Islet on the ocean side, and towards the northern extremity of the Great Barrier Reef. Its ultra-Australian range extends to the tropical and sub-tropical seas of both hemispheres, and is found among other localities in the Atu Islands, Philippine Islands, the Moluccas, Java, Borneo, the Maldive Islands, Mauritius, Rodriguez, the West Indies, and Half Moon Key, British Honduras. There is so much difference in the adult and immature plumage of this species, that Linnaeus, who originally described it so far back as 1776, described the former under the name of *Pelicanus piscator*, and the latter under the name of *P. fiber*. On Raine Islet in October, 1910, Dr. W. Macgillivray found this species breeding, both in the adult and immature plumage, the Red-legged Gannet standing unique in the members of the genus *Sula* inhabiting the islands contiguous to Australia, inasmuch as it is the only species that constructs a compact nest of sticks and twigs and places it on a low bush.

In his folio edition of the Birds of Australia Gould wrote: "Since the year 1837, when I published the description of a Gannet in the 'Proceedings of the Zoological Society,' under the



RED-LEGGED GANNET ON NEST.

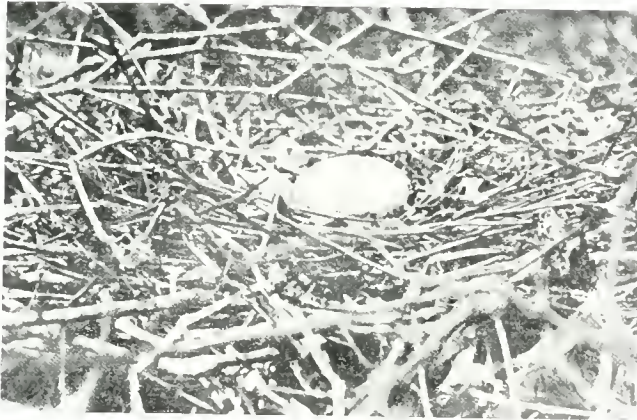
name of *rubripes*, from the only specimen that had then come under my observation, I have had opportunities of examining many other examples, and I now possess many specimens in various stages of plumage, both from Australia and China, as well as the intermediate countries, which, independ-

ently of proving the great extent of range enjoyed by this species, have convinced to an almost certainty that the various specific names of *candida*, *erythrorhyncha* and *rubripes* are merely synonyms of the bird described by Linnaeus under the name of *Pelicanus piscator*. The specimen from which Lesson took the description of his *erythrorhyncha* was doubtless a mounted one or a dried skin, for immediately after death the beautiful and delicate green colouring of the bill and face changes to red; in like manner the feet change from the brightest crimson to dull orange-red, whence the term of *rubripes* was suggested to me as an appropriate appellation; this term I would gladly retain did not the law of priority demand that it should be otherwise."

"The Red-legged Gannet is very abundant all along the northern shores of the Australian continent; it breeds in great numbers on Raine Islet, from which locality my collection is enriched with several fine specimens; for these my thanks are due to Lieut. J. M. R. Ince, R.N., who, independently of his duties as superintendent of the erection of the beacon on the island, found amusement and occupation for his leisure moments in studying its interesting ornithology. While acknowledging my obligations to Lieut. Ince, I am bound to add that I am no less indebted to Mr. John Macgillivray for the following notes, as well as a carefully executed diagram of the bill and face, by means of which I have been enabled to colour the soft parts

correctly, points so necessary to be observed that I trust all future collectors will not fail to note them. Specimens in every stage of plumage were procured, from the uniform dull brown of the first year to the pure white of the adult, and Mr. MacGillivray observed that the colouring of the bill and soft parts also varies with the individual; in the first stage the bill is of a delicate bluish-pink, the pink tint predominating at the base of the upper mandible, the bare patch about the eye of a dull leaden-blue, and the pouch flesh coloured; in the second the colouring of these parts is similar, but somewhat brighter, and this gradually gives place to the colouring shown in the foremost figure of the plate."

From Broken Hill, South-western New South Wales, Dr. W. Macgillivray wrote:—"I did not see *Sula piscatrix* during my trip to North-eastern Queensland, in 1910, until we were lying behind the Barrier Reef, anchored on the coral, waiting for the weather to moderate sufficiently to enable us to go out to Raine Islet through the opening. The birds of this species which visited us here were in immature plumage, both mature and immature birds, however, joined the crowd of birds which escorted us to the island, there to blend with the immense cloud of feathered creatures continually hovering over the place. On the 30th October, 1910, we found that this species nested in groups on different parts of the island, choosing the low growing



NEST AND EGG OF RED-LEGGED GANNET.

perennial shrub, with cordate greyish-green leaves and a yellow mallow-like flower, on which to place their nests, substantial platforms of interwoven sticks about eight to twelve inches in diameter, with an inch depression in the centre for their single egg. Only very few birds were sitting on eggs, and these were mostly at an advanced stage of incubation, the great majority having reared their young, most of which were flying, or almost ready to fly. The young are hatched naked and with eyes closed, but have two curious elon-

gate tufts of down, one on either side of the occiput and one over each eye; the skin is of a leaden colour, but the bill is much shorter than in the other two species and the mask black; the feet are of a fleshy tint. The down covering is of a dusky white, the curious head plumes are soon lost, and as the bird grows the mask darkens in colour. The fully feathered young bird is of a uniform dirty light grey, with darker wings, a black mask, and slaty legs with a pinkish tinge. We found some adults sitting on nests of the same general colouring as these grown nestlings, but with the pale bluish mask with bright pink edging under the throat and over the eyebrows characteristic of the fully plumaged adult. These were sitting on eggs on the point of hatching, and refused to budge, so that we had a good opportunity of examining and photographing them. This species did not have the same habit as the other two of disgorging the contents of its crop when interfered with."

Both the foregoing figures are reproduced from photographs taken by Dr. W. Macgillivray on Raine Islet, on the 30th October, 1910.

The nests are built of interwoven sticks, in shrubby bushes, well off the ground. Only one egg is laid for a sitting.

The eggs of *Sula piscatrix* may, as a rule, easily be distinguished from those of the other species of Gannets, especially those of *Sula sula*, which they most resemble, by being smaller and

more lengthened in form, approaching more nearly those of some of the larger species of Cormorants. They are of the same pale greenish or bluish-white, the shell being thickly coated with a calcareous covering, and usually nest stained, scratches here and there, made by the nails of the sitting bird, revealing the true colour of the shell. Three eggs in Dr. W. Macgillivray's collection, taken by him on the 30th October, 1910, from different nests on Raine Islet, measure respectively:—Length (A) 2.37 × 1.47 inches; (B) 2.4 × 1.58 inches; (C) 2.33 × 1.53 inches. All the eggs taken that day were either fresh or only slightly incubated.

Sula sula.

BROWN GANNET.

Pelecanus sula, Linn., Syst. Nat., Tom. I., p. 218 (1776)

Sula fusca, Gould, Bds. Austr., fol. Vol. VII., pl. 78 (1848).

Sula fiber, Gould, Handbk. Bds. Austr., Vol. II., p. 507 (1865).

Sula leucogastra, Scat. and Salvin, Proc. Zool. Soc., 1878, p. 651.

Sula sula, Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 436 (1898); Sharpe, Hand-l. Bds., Vol. I., p. 236 (1899).

ADULT MALE.—*Entire head, neck, chest and all the upper parts, including the wings and tail dark brown: breast, abdomen and under tail-coverts pure white: "bill bluish towards the base, white at the tip; feet light green: eyes grey"* (Murray). *Total length 28.5 inches, wing 15, tail 7.5, bill $\frac{1}{2}$, tarsus 2.85.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—Coasts of North-western Australia, Northern Territory of South Australia, Queensland, Islands of Torres Strait.

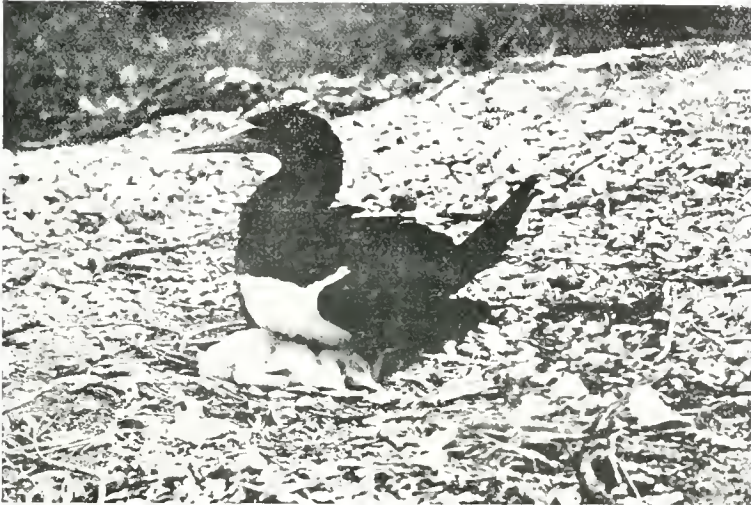
IN Australian waters the range of the Brown Gannet extends, roughly speaking, around the northern half of the continent, and according to Mr. W. R. Ogilvie-Grant in the "Catalogue of Birds in the British Museum," it is found throughout the "tropical and sub-tropical seas of the world, except the Pacific coast of America, where its place appears to be taken by *Sula brewsteri*." During the voyage of the "Rattlesnake" Mr. J. MacGillivray found it breeding on Bramble Cay. The members of the "Chevert Expedition" also found it breeding on the same island in 1875, and the late Mr. George Masters, one of the members, recorded observing it all along the Eastern Coast of Queensland, from Moreton Bay to New Guinea. Both birds and eggs were obtained by the members of the "Challenger Expedition," on Raine Island, during the same year, nesting in the centre of the island along with *Sula cyanops*. Dr. E. P. Ramsay records it from Cardwell Bay, but states that it is more plentiful off a small reef to the south-east of Hinchinbrook Island, and near the mouth of the Herbert River; also in a collection of birds made on the southern shore of the Gulf of Carpentaria, and Gould records it from Port Essington, in the Northern Territory of South Australia. Mr. James Walker, R.N., found it breeding in May, 1891, on Adèle Island, about forty-five miles to the north of the entrance to King Sound, North-western Australia, in company with *Sula cyanops*. Mr. J. T. Tunney, collecting on behalf of the Western Australian Museum, Perth, also found it nesting in company with *S. cyanops*, on Bedout Island, opposite Condon and the entrance to the De Grey River, in North-western Australia.

Referring to this species in his "Birds of America,"† Audubon writes:—"The flight of the Booby (*Sula fusca*) is graceful and extremely protracted. They pass swiftly at a height of from twenty yards to a foot or two from the surface, often following the troughs of the waves to a con-

* Cat. Bds. Brit. Mus., Vol. XXVI., p. 439 (1898). † Bds. Am., Vol. VII., p. 59.

siderable distance, their wings extended at right angles to the body: then, without any apparent effort, raising themselves, and allowing the rolling waters to break beneath them, when they tack about and sweep along in a contrary direction in search of food, more in the manner of true Petrels. Now, if you follow an individual, you see that it suddenly stops short, plunges headlong into the water, pierces with its powerful beak and secures a fish, emerges again with inconceivable ease, after a short interval rises on wing, performs a few wide circlings, and makes off towards some shore. At this time its flight is different, being performed by flappings for twenty or thirty paces, with alternate sailings of more than double that space. When overloaded with food, they alight on the water, where, if undisturbed, they appear to remain for hours at a time, probably until digestion has afforded them relief. The expansibility of the gullet of this species enables it to swallow fish of considerable size, and on such occasions their mouth seems to spread to an unusual width. In the throats of several individuals that were shot as they were returning to their nests, I found mullet measuring seven or eight inches that must have weighed fully half a pound."

"When procured alive they feed freely, and may be kept any length of time, provided they are supplied with fish. No other food, however, could I tempt them to swallow, excepting



BROWN GANNET AND YOUNG.

strips of turtle, which after all they did not seem to relish. Some authors have stated that the Frigate Pelican and the Lestris force the Booby to disgorge its food that they may obtain it, but this I have never witnessed. Like the common Gannet (*Sula bassana*) they may be secured by fastening a fish to a soft plank, and sinking it a few feet beneath the surface of the water, for if they perceive the bait, which they are likely to do if they pass over it, they

plunge headlong upon it and drive their bill into the wood."

Dr. W. Macgillivray wrote as follows from Broken Hill, South-western New South Wales:—"Odd birds of *Sula leucogaster* were met with as we sailed up the coast of North-eastern Queensland in 1910, but not in any numbers until we approached the Ashmore Banks, three in number, lying about half way between the Sir Charles Hardy Islands and the opening to Raine Islet in the Great Barrier Reef. On approaching these sandbanks numbers of the birds came off to inspect us, and kept flying closely round the boat, giving us every opportunity to admire the rich brown colouring of the upper surface, and the pure white of the under parts, which latter was often a pale green reflecting the colouring of the sea. The nearer we got to the banks the greater the numbers of our feathered escort: they hovered over our stern, had a good look, then flew ahead and settled on the water, waited till we passed them, and flew after us again to repeat the performance. On nearing the bank it was seen to be covered with birds, mostly Brown Gannets, with Gulls, Lesser-crested Terns and Sandpipers. On landing most of the birds rose in a cloud, leaving about thirty sitting birds; these allowed us to approach to within about ten feet, but no closer. There were about fifty nests containing eggs, thirty of

these having pairs, the rest single eggs, being mostly incomplete clutches, as laying seemed only to have commenced recently, all eggs were fresh, and many nests were being formed. Of those containing eggs some consisted of merely a depression scraped in the sand, others again had gathered round them straw, sticks, bits of coral and shells, the whole nest being about one foot in diameter and about four inches in depth. Many of the eggs are destroyed by Gulls, these birds pouncing upon the eggs so soon as the Gannets rise from them. These Gannets were also nesting in lesser numbers on No. 2 Sandbank of this group. Three days later, 30th October, 1910, I landed on Raine Islet, a vegetated sandbank sixty five miles north-east from Cape Grenville, and eight miles outside the Raine Islet opening, through the Great Barrier Reef. On nearing this island we were again under escort of a great concourse of birds, three species of Gannet (*S. cyanops*, *S. leucogaster* and *S. piscatrix*), Noddies, Sooty Terns and Frigate Birds. Many of the Gannets flying were immature birds. The island is covered from end to end with nests and young and old birds, nine-tenths of them being Brown Gannets sitting on eggs, newly hatched young, young in down, and others nearly fully feathered; two-thirds of the nests contained either a pair of eggs or a young bird: where nests contained single eggs, this was mostly due to the depredations of Gulls. The eggs varied greatly in size and shape, the lime coating on newly laid eggs being quite soft and easily marked, but soon hardens on exposure. The young are hatched naked, the skin being of a pale leaden colour all over, even to the mask and feet; the nestling soon becomes covered with white down, which it retains until almost of full size, when the primary feathers appear of a dark grey colour, and this is general of the feathers which appear on the head, back and wings of the fully fledged young bird, with dirty greyish-white on breast and under parts of wing. The nests were placed everywhere on rock, sand or 'pigface,' and were of the same description as those on the Ashmore Bank, the nests, containing fresh eggs, being mostly merely a depression with very little surrounding material. Where the bird had been sitting for some time there was often a fairly respectable accumulation of broken coral, stones, sticks and other material round about which they procure as they go on incubating. In approaching these birds many fly off after a short shuffling run, others will wait, and only leave after several protesting squeakings and disgorging several fish, often eight or ten inches in length, this as an offering rather than as an offensive measure."

The preceding figure is reproduced from a photograph taken by Dr. W. Macgillivray on Raine Islet.

The members of the "Chevert Expedition" to North-eastern Australia and New Guinea, organised by the late Sir William Macleay of Sydney, found this species breeding on Bramble Cay, Torres Strait, in 1875. The nests were built upon the ground, and consisted of a few dried sticks and twigs, and placed so closely together, that it was difficult to walk without treading upon them, most of the nests contained two eggs, oval in form, of a bluish-white colour, thickly coated with lime, which in some places was scratched off, revealing the true colour of the shell. A set of two in the Australian Museum Collection measure as follows:—Length (A) 2.33 × 1.42 inches; (B) 2.45 × 1.65 inches. Specimens in the Macleay Museum measure:—Length (A) 2.35 × 1.48 inches; (B) 2.4 × 1.45 inches. A set of two measures:—Length (A) 2.25 × 1.58 inches; (B) 2.36 × 1.65 inches.

Mr. Bernard H. Woodward, F.G.S., Director of the Perth Museum, Western Australia, has kindly sent on loan fourteen eggs, collected by Mr. J. T. Tunney between the 20th and 25th May, 1901, on Bedout Island, North-western Australia. They vary considerably in shape, ranging from a short to lengthened ovals and ellipses, in fact some of the latter might easily be mistaken for Cormorants' eggs. The true colour of the shell varies from a light bluish-white to a pale bluish-green, but is more or less incrustated with lime, on some specimens being evenly and smoothly covered over the surface of the shell, on others the lime is rough and irregularly deposited, being scratched or chipped off in places, revealing the pale bluish-white or bluish-

green colour of the shell. Many, too, have brown or yellowish-brown nest stains. Two small eggs measure:—Length (A) 2.26 × 1.6 inches; (B) 2.27 × 1.51 inches; two medium sized eggs measure:—Length (A) 2.46 × 1.62 inches; (B) 2.55 × 1.71 inches; three elongated specimens measure:—Length (A) 2.7 × 1.7 inches; (B) 2.65 × 1.58 inches; (C) 2.62 × 1.47 inches.

A set of two eggs taken by Dr. W. Macgillivray on the 27th October, 1910, on Ashmore Bank, No. 3, measures:—Length (A) 2.38 × 1.68 inches; (B) 2.48 × 1.68 inches. Another set of two eggs taken by him on the 30th October, 1910, on Raine Islet, from a nest consisting of a depression in the sand surrounded by shells, sticks and other debris, and from which the bird was flushed, measures:—Length (A) 2.43 × 1.68 inches; (B) 2.38 × 1.61 inches.

Off the North-western Australian coast tenanted nests were found on Bedout Island in April, and on Adelé Island in May. On Raine Islet, off the North-eastern Australian coast, Dr. W. Macgillivray found eggs and young at the end of October.

Family FREGATIDÆ.

Genus FREGATA, *Brisson.*

Fregata ariel.

LESSER FRIGATE-BIRD.

Attagen ariel, Gould, in Gray's Gen. Bds., Vol. III., p. 669 (1845); *id.*, Bds. Austr., fol. Vol. VII., pl. 72 (1848).

Tachypetes minor, Gould, Handbk. Bds. Austr., Vol. II., p. 499 (1865).

Fregata ariel, Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 477 (1898); Sharpe, Handl. Bds., Vol. I., p. 237 (1899).

ADULT MALE—“*Entire plumage brownish-black, the feathers of the head glossed with green, and the lengthened plumes of the back with purple and green reflexions; orbits and gular pouch deep red; bill bluish horn colour; iris black; feet dark reddish-brown*” (Gould.)*

Distribution.—Seas of Northern, North-eastern and North-western Australia.

THE Lesser Frigate-bird is found ranging over the seas washing the shores of the northern half of the Australian continent, but extends lower down on the western than the eastern side, Mr. W. R. Ogilvie-Grant recording its full habitat in the “Catalogue of Birds in the British Museum”† as the “tropical parts of the Indian and Pacific Oceans, ranging west to Madagascar and east to the Society Islands. Among its breeding haunts in Australian waters are Raine Islet, where it was obtained by the late Commander Ince, R.N., of H.M.S. “Fly;” also by the members of the expedition of H.M.S. “Challenger,” Adele Island on the North-western Australian Coast, where it was found breeding by Mr. James Walker, R.N., of H.M.S. “Penguin,” and Bedout Island, where Mr. J. T. Tunney, a collector of the Western Australian Museum, secured both birds and eggs in April, 1901.

Gould remarks:—| “The late Commander Ince, R.N., who, during the surveying voyage of H.M.S. ‘Fly’ was for some time stationed on Raine Islet, superintending the erection of a beacon, informed me that on landing on this small island, which is situate in lat. 12° S., at about seventy miles from the north-east coast of the Australian continent, and surrounded by a part of the Great Barrier Reef, he ‘found this bird breeding in colonies at its south-western corner, the

* Handbk. Bds. Austr., Vol. II., p. 500 (1865). † Cat. Bds. Brit. Mus., Vol. XXVI., p. 449 (1898).

‡ Handbk. Bds. Austr., Vol. II., p. 500 (1865).

nests being comprised of a few small sticks collected from the shrubs and herbaceous plants which alone clothe the island, and placed either on the ground or on the plants a few inches above it. The eggs, generally one but occasionally two in number, are of a pure white, not so chalky in appearance as those of the Gannet, and nearly of the same shape at both ends. Upon one occasion I killed the old birds from a nest that contained a young one; on visiting the spot I found the young bird removed to another nest, the proprietors of which were feeding it as if it had been their own; I am sure of this fact, because there was no other nest near it containing two young birds. Some of the eggs were quite fresh, while others had been so far sat on that we could not blow them, and many of the young birds must have been hatched some two or three weeks. We regarded these birds as the 'Falcons of the sea,' for we repeatedly saw them compel the Terns, Boobies and Gannets to disgorge their prey, and then adroitly catch it before it fell to the ground or water. We never saw them settle on the water, but constantly soaring round and round, apparently on the watch for what the smaller birds were bringing home. I have found in their pouches young turtles, fish, cuttle-fish and small crabs."

In the report of the "Voyage of H.M.S. Challenger," Messrs. Sclater and Salvin quote the following notes of Mr. (now Sir) John Murray, one of the naturalists of the "Challenger Expedition:"—" *Fregata minor*, male, Raine Island: Legs and feet black; bill grey; skin of throat red, eyes red. The skin of the throat is of a lighter red in the male than in the female. The stomach contained remains of cuttlefish, *Spirula* and a fish. Female, young female and nesting female: Feet red; eyes red. The bill and feet of the young birds are of a white colour, with a shade of blue; eyes black. In the adult birds the male has the feet and eyes black, the female has those parts red. This holds good in all our specimens. Male, Admiralty Island: Eyes black, flesh of throat red. Stomach contained fish. I shot this bird from the pinnace, while with several others. It was hovering over a shoal of fish. At Raine Island there was a rookery of this Frigate-bird in the centre, of about thirty or forty nests. There were eggs in the nests, and all the young, but one or two, were perched on the branches of a low shrub: these had red heads, and looked very like Vultures at first sight. The nests were formed of sticks, laid on the tops of small bushes, about one foot from the ground."

Mr. James Walker, R.N., of H.M. Surveying-ship "Penguin," in "The Bird Life of Adelé Island, North-western Australia," remarks as follows: - "Last, and most interesting of all, came the breeding place of the Frigate-bird, *Tachypetes minor*, Gmelin. These fine birds had been noticed while we were wading over the flats, soaring high above all the other sea-fowl, many of them indeed reduced to mere black specks against the blue sky. Extending for more than half a mile along the middle of the island was a narrow strip of open land, almost free from the usual high grass, and covered chiefly with the *Ipomea*. Here the nests of the Frigate-birds were to be seen in clusters or bunches of from five to six to as many as twenty together (very rarely singly) and built directly on the ground of stalks of grass and *Ipomea*, small twigs, etc. The average dimensions of each nest were about a foot in height, by a little more in diameter, though frequently the clusters of old nests, which were evidently used for a succession of years, formed masses of very considerable size. As in the case of the Gannets and Cormorants, the hollow in the nests was very slightly defined, and in each was deposited a single egg (never more than I could observe), pure white in colour, very thin shelled, and with only a slight limy coating. A few of the eggs were new-laid and easily recognisable by their delicate and beautiful appearance, but the great majority were very 'hard set,' and there were a great many young birds in the nests. These when just out of the egg were quite naked like the young Gannets, which they then greatly resembled; when more advanced they were covered with a scanty white down, and had a conspicuous saddle-shaped band of dark grey feathers across the back and scapular region. Nearly all the brooding birds were females, some of them in quite immature dress:

* Ibis, 1894, p. 258.

but among them were many fine old cocks, conspicuous by their deep green-glossed black plumage and scarlet throat pouches. A few stray Gannets, usually of the white species, had taken up their quarters for incubation among the Frigate-birds, but were evidently regarded with but little favour by the legitimate occupants of the ground."

"The tameness, or rather the indifference of these birds, especially of the females, was most surprising. As one walked among the nests the sitting birds nearest at hand merely stretched out their necks, snapped their long slender hooked beaks, and uttered a croak like that of the White Gannet (*Sula gannops*), but very much more feeble, while to obtain the egg it was necessary to push the bird right off the nest, when it took wing without any apparent difficulty. The birds on the adjoining nests, little more than arm's length distant, meanwhile took absolutely no notice of the intruder. The young birds, when of any size, were much more vicious than their parents, and energetically resisted any attempt to take them up, croaking and snapping sharply with their bills. They were much infested with a large species of *Ixodes*, and a flat brown parasitic fly closely resembling in general appearance the well-known *Hippobosca equina* of Europe, was plentiful about the nests, and was to be seen running over the feathers of the birds. A large number of the eggs were collected and, when boiled hard, turned out by no means bad eating, the 'white,' as is the case with the eggs of most sea-birds, being quite transparent and jelly-like, and the flavour not in the least degree rank or disagreeable."

Mr. Bernard H. Woodward, Director of the Perth Museum, Western Australia, has kindly forwarded a photograph of a large breeding colony of *Fregata ariel*, taken during a visit of Mr. J. T. Tunney, the Museum collector, to Bedout Island, lying off the coast of North-western Australia in April, 1901. Apparently the nests are built in almost leafless, perhaps dried and dead herbage, and about a dozen unoccupied nests in the foreground contained a single white egg each.

Dr. W. Macgillivray wrote as follows from Broken Hill, South-western New South Wales :—
 "When passing between Cape Restoration and Restoration Island in October, 1910, we saw several Frigate-birds (*Fregata ariel*) sailing round the island; more were seen waiting round the rocky headlands of the Sir Charles Hardy Islands for home-coming Terns. When anchored behind Escape River Island I witnessed an encounter between one and a Lesser Crested Tern (*S. media*): the great bird buffeted the screaming Tern again and again, until the latter disgorged three fish, which were easily caught, and instantly swallowed, by an expert double dive, when he rose again in the air to resume his watch for other Terns. On the eastern side of Raine Islet, near its centre, was a nesting place of this species at the time of my visit, 30th October; it was occupied by about fifty young birds, fully feathered, and able but as yet unwilling to fly, a number of others were flying about with the adult birds. The young birds seemed to be in pairs, and the nests, which were much trampled and covered with excreta, were built up to six inches or more, of interwoven twigs, and were often placed on a little eminence. The young birds were brown in general colouring, very like that of the lighter kinds of Wedge-tailed Eagles, and their whole attitude and colouring reminded one very much of the Hawk tribe. They were all of about the same age, and I should say that the nesting must begin in the early winter months, and is contemporaneous with that of the Red-legged Gannet."

While resident at Point Cloates, in North-western Australia, Mr. Tom Carter sent me the following notes :—
 "The appearance of the Lesser Frigate-bird (*Tachypetes minor*) was a sure indication of an approaching hurricane, or of very stormy weather further north, and they were classed by the blacks, with other occasional visitors at such times, as 'rain-brothers.' There were numbers of them at Point Cloates at the commencement of the severe hurricane of the 25th and 26th January, 1898. Several hovering over the house were secured with a right and left barrel shot, on the 31st March, 1899. A small flock was also seen on the 10th February, 1900.

As soon as the weather cleared they returned north, and on one occasion were distinctly seen, late at night, flying north in the bright moonlight."

One egg usually constitutes the sitting, but sometimes two are laid. They are oval or elongate-oval in form, the shell being coarse-grained, chalky-white, and lustreless. An average specimen in the Australian Museum Collection, taken on Raine Islet by the late Mr. John MacGillivray, measures 2.5×1.7 inches. Four eggs received on loan from Mr. Bernard H. Woodward, Director of the Perth Museum, and taken by Mr. J. T. Tunney, the Museum collector, on Bedout Island, between the 20th and 26th May, 1901, measure as follows:—Length (A) 2.52×1.65 inches; (B) 2.52×1.7 inches; (C) 2.45×1.77 inches; (D) 2.5×1.79 inches.

Family PHAËTHONTIDÆ.

Genus PHAËTHON, *Linnaeus*.

Phaëthon rubricauda.

RED-TAILED TROPIC-BIRD.

Phaëthon rubricauda, Bodd., Tabl. Pl. Enl., p. 57 (1783).

Phaëthon phoeniceus, Gould, Bds. Austr., fol., Vol. VII., pl. 73 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 501 (1865).

Phaëthon rubricauda, Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI., p. 151 (1898); Sharpe, Handl. Bds., Vol. I., p. 238 (1899).

ADULT MALE.—*General colour above and below pure silky white, with a delicate roseate tinge, which is more pronounced on the outer webs of the quills: the shafts of the latter, except near their tips, black, the innermost secondaries having a broad central stripe of a dark greyish-black, except at their tips, the lengthened flank feathers similarly marked with greyish-black, but of a lighter hue; tail-feathers white with a slight roseate tinge, their shafts black at the base, white on the apical third of the feather, except the central pair, which are very long and their webs attenuated have the shafts black for their entire length, the apical half of the webs being a deep red: a crescentic marking in front, and a line extending over and behind the eye dull black, the centres of some of the feathers on the crown of the head and nape dull black: bill orange-red with a blackish streak along the nasal aperture. Total length 34 inches, wing 13.25, central pair of tail-feathers 17.5, outer tail-feathers 4, bill 2.5, tarsus 1.2.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—Western Australia, North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Lord Howe and Norfolk Islands.

IN Australian waters the range of the Red-tailed Tropic-bird, or "Boatswain-bird," extends to the seas washing nearly three sides of the continent; in the southern limits it can only be looked upon as a straggler. The islands of Torres Strait are its stronghold, and it was at one time common on Norfolk Island, and is still so on Lord Howe Island. The decrease in its numbers on the former island and adjacent islets, is due, I am informed, to its being hunted for its red elongated central tail-feathers. In October and December, 1887, a series of these birds and their eggs were procured on behalf of the Trustees of the Australian Museum, by Mr. E. H. Saunders, from the western side of Mount Lidgbird, on Lord Howe Island. Dr. P. H. Metcalfe, late Resident Medical Officer on Norfolk Island, obtained its eggs there during a number of years, and also on the adjacent Philip and Nepean Islands. I have never seen this species from any part of Southern Queensland, or the New South Wales Coast. In the former State Dr. E. P. Ramsay states it is seen occasionally off Hinchinbrook Island, and also records it as inhabiting

New South Wales, and Mr. W. R. Ogilvie-Grant enumerates an unlocalised adult skin from the latter State in the "Catalogue of Birds in the British Museum," which was presented by the Trustees of the Australian Museum. During the twenty five years I have been connected with the institution, no specimen has been received from New South Wales waters, and if it occurs at all, it can only be looked upon as a straggler, like *Phaethon lepturus* I recorded from Botany Bay. That sea-birds are frequently driven by adverse winds, or wander far out of their usual range, is well known: we have had an instance of it in *Fregata aquila*, an inhabitant of the tropical seas, being obtained at Brighton, near Melbourne, Victoria. The present species, too, was first added to the North American List, from a single specimen, by Mr. A. W. Anthony, who wrote in "The Auk:"—"On 23rd July, 1807, a Red-tailed Tropic Bird, *Phaeton rubricauda*, was shot a short distance north of Guadalupe Island, thus adding the three species of the genus to our fauna. The Red-tailed Tropic-bird has, I think, heretofore been known only from the South Pacific. Whether it is of regular occurrence in south-western waters will be ascertained when we have a better knowledge of the pelagic species of this little known region."

Respecting this species on Raine Islet, where it was also met with by the members of the "Challenger Expedition," Mr. J. MacGillivray communicated the following note to Gould:—"This Tropic-bird was found by us on Raine Islet, where, during the month of June, about a dozen were procured. Upon one occasion these were observed performing sweeping flights over and about the island, and soon afterwards one of them alighted; keeping my eye upon the spot, I ran up and found a male bird in a hole under the low shelving margin of the island bordering the beach, and succeeded in capturing it after a short scuffle, during which it snapped at me with its beak, and uttered a loud, harsh, and oft-repeated croak. It makes no nest, but deposits its two eggs on the bare floor of the hole, and both sexes assisted in the task of incubation. It usually retires from the sea about noon, soaring high in the air and wheeling round in circles before alighting. The contents of the stomach consisted of the beaks of cuttle-fish."

From information received from Dr. P. Herbert Metcalfe, late Resident Medical Officer on Norfolk Island, Dr. W. M. Crowfoot writes as follows in "The Ibis:"—"The Tropic-bird (*Phaethon rubricauda*) breeds on Norfolk, Nepean and Philip Islands, but the last mentioned island is its principal resort, and here it may be counted by hundreds. It lays its single egg on ledges of rock, in cracks of the cliffs, under overhanging boulders and in such-like situations. The bird defends its egg with its strong beak, and may be easily caught on the nest. On Norfolk Island the eggs are difficult to get, but on Philip Island they may be readily obtained. The young Tropic-bird is a curious looking object, being completely covered with thick snow-white down."

Lieutenant J. H. Macfarlane, R.N., writing in "The Ibis" † on the birds observed by him during a cruise in H.M.S. "Constance" in the Western Pacific, remarks:—"Ducie Island, in about 20° S., which was visited on the 16th March, 1884, is a very dangerous atoll, having a sandy beach, with some clumps of bushes, not more than forty feet high on its northern side, and a barrier reef over which a very heavy surf was breaking, fringes the remainder. The lagoon is very shallow, and has a few passages suitable for boats in calmer weather. Landing was effected on the northern side, where the British barque "Arcadia" was laying a total wreck, having most likely gone on shore during night or thick weather. The Red-tailed Tropic-bird (*Phaethon rubricauda*), was breeding in great numbers, and our blue-jackets enjoyed themselves greatly in collecting eggs and bundles of the red tail-feathers. The latter operation was rendered easy; the birds being without guile, allowed themselves to be lifted up by the feathers, and their own weight did the rest."

* Auk, Vol. XV., p. 39 (1898).

† Handbk. Bds. Austr., Vol. II., p. 502 (1865)

‡ Ibis, 1885, p. 268.

§ *Loc. cit.*, 1887, p. 211.

While resident at Point Cloates, North-western Australia, Mr. Tom Carter wrote me as follows: "A Red-tailed Tropic-bird (*Phaethon rubricauda*) was shot near Point Cloates, while hovering over our camp on the 23rd April, 1891, and was the only one we noted."

The single egg laid by the bird for a sitting is deposited in almost inaccessible positions on the face of precipitous cliffs, or laid under the shelter of a projecting rock, and consequently are usually difficult to procure through the sitting bird violently disputing the possession of it with an intruder anxious to draw it away. On unfrequented islets it more often breeds in less protected situations. Its eggs are extremely variable in size, shape, colour and markings. Typically they are oval or thick ovals in form, but in a series of fourteen eggs now before me are an elongate-oval and a rounded-oval, becoming greatly pyriform at the smaller end, the shell being coarse-grained, dull and lustreless, and having in some places small limy excrescences. Some specimens are of a pale pinkish-red ground colour, which is almost obscured by minute freckles and spots of a deeper hue, intermingled with numerous larger underlying markings of purplish-grey: others have the ground colour dull white, which is freckled, spotted and blotched with purplish-red and reddish-black, the latter colour being frequently confined to the larger end, where in some instances it appears in the form of a cap or zone, while specimens may be found of a warm reddish-white almost uniformly covered with rich reddish-brown or pale purplish-brown, or smeared all over with the latter colour, which in places appear to have been rubbed off the shell when wet, giving it a longitudinally streaked appearance. Two specimens are almost pure white, one having a faint wash of pale purple the other of brown. Six typical-sized specimens from Lord Howe Island measure respectively as follows:—Length (A) 2.47 × 1.88 inches; (B) 2.67 × 1.97 inches; (C) 2.64 × 2.01 inches; (D) 2.72 × 1.78 inches; (E) 2.66 × 1.86 inches; (F) 2.64 × 1.88 inches. A very small egg measures:—Length 2.32 × 1.68 inches. A pyriform egg measures:—Length 2.53 × 1.92 inches. Four eggs taken by Dr. P. Herbert Metcalfe, on Philip Island, lying off Norfolk Island, measures respectively as follows:—One taken on the 7th December, 1886, length 2.75 × 1.95 inches; another taken on the 6th November, 1890, length 2.47 × 1.78 inches; two taken on the 7th January, 1891, length (A) 2.4 × 1.85 inches; (B) 2.74 × 1.85 inches.

Immature birds have the general plumage white, a black crescent in front of the eye, feathers on the crown of the head centred with black, the hind neck, back, scapulars, rump and upper tail-coverts and centre of wing transversely barred with black, the primaries and their coverts white with a narrow black central streak widening out near their tips into a broad band or large subterminal spot; secondaries white, transversely barred with black, the innermost series with a very broad blackish central spot occupying most of the feather; tail-feathers white basal portion of their shafts blackish. Wing 12 inches.

The breeding season on Lord Howe and Norfolk Islands begins in September or October, and extends over the five following months. On Ducie Island, in the Western Pacific, eggs were found in June, so were they on Raine Islet, off the north-eastern coast of Queensland.

Family PELECANIDÆ.

Genus PELECANUS, *Linnaeus*.

Pelecanus conspicillatus.

PELICAN

Pelecanus conspicillatus, Temm., Pl. Col., Tom. V., pl. 276 (1824); Gould, Bds. Austr., fol. Vol. VII, pl. 74 (1848); *id.*, Handbk. Bds. Austr., Vol. II., p. 486 (1865); Ogilvie-Grant, Cat. Bds. Brit. Mus., Vol. XXVI, p. 483 (1898); Sharpe, Hand-l. Bds., Vol. I., p. 238 (1899).

ADULT MALE.—*General colour above and below pure white; a line of feathers along the shoulder, the scapulars, some of the inner median and the larger series of the greater wing-coverts and quills black; sides of the rump, some of the smaller upper tail-coverts and the tail-feathers black. Total length in the flesh 58 inches, wing 25, tail 8.5, bill 18, tarsus 5.*

ADULT FEMALE.—*Similar in plumage to the male.*

Distribution.—North-western Australia, Northern Territory of South Australia, Queensland, New South Wales, Victoria, South Australia, Central Australia, Western Australia, Islands of Bass Strait, Tasmania, New Guinea.

IN favourable situations the Pelican is distributed over nearly the whole of the Australian continent, the Islands of Bass Strait, Tasmania, the Islands of Torres Strait and portion of New Guinea. It frequents alike the estuaries of rivers and mud flats of the coast and contiguous islands, and the inland rivers and lakes of the interior portions of the continent. At sea one may frequently observe it from the deck of some coasting vessel whitening some isolated rock with its apparently, in the distance, pure white plumage, sailing majestically away, or taking flight on too close an approach. It is a bird that one does not require as a rule to go a great distance from the confines of any large coastal city to observe. My first acquaintance with this species was near Melbourne, Victoria, in my early boyhood days. At that time Albert Park Lake, the mouth of the Yarra River, the Botanic Gardens, and that stretch of sandy waste between Albert Park and St. Kilda, the low lying parts of which were covered with brackish swamps, now known as Middle Park, were all resorts of this species. All these places have now either been drained or improved, and one would probably look in vain to find a Pelican, although, perhaps, would be more fortunate at Altona Bay, and on towards Point Cook. It is more frequently met with in the neighbourhood of Sydney, but in limited numbers, generally in small flocks of four to eight or more in number, although one may often see isolated examples. Favourite feeding grounds are the mud flats at the entrance of Cook's River, Botany Bay, the upper parts of the Parramatta River, and the shores of Lake Narrabeen and Port Hacking. In Queensland I observed it near the entrance of the Brisbane River, but it was far more common on Cook Island, in the vicinity of the entrance to the Tweed River, in the north-eastern portion of New South Wales, and where it breeds. Inland, in the latter State, it frequents the margins of rivers and lakes, especially in the Southern and Western Districts, breeding in favourable seasons in the neighbourhood of the Murray River and on an island in Lake Boola-boulka. It breeds in similar situations in North-western Victoria, Dr. D'Ombraïn showing me an interesting photograph of a breeding place on Pelican Island, in Lake Corangamite, with a number of young birds crowded together for mutual protection. I have also received the eggs of this species taken on an island in one of the Gippsland Lakes, in South-eastern Victoria; also from various islands in Bass Strait.

While the Pelican is thoroughly at home on the water, it has an awkward rolling gait when on land. Often have I seen them in Victoria at Fishermen's Bend, near the mouth of the Yarra River, and on French Island in Western Point Bay, with an ungainly walk waddle up to where the fishermen had just left the seaweed and refuse from their frequently drawn nets, to secure some spoil. These birds devour a large number of fish, and at Albert Park Lake, on one occasion, I saw one wrestle with and finally capture a large-sized eel. Stomachs of specimens examined contained principally the remains of fish, salt and fresh water crustaceans, offal, and one presented to the Trustees of the Australian Museum in September, 1898, by Mr J. A. Pfeffer, of White Rock, near Bathurst, New South Wales, was alive with intestinal worms.

Dr. Walter E. Roth, late Northern Protector of Aborigines, Queensland, thus refers to the mode of capture of this species by the blacks:—"At that portion of a creek or waterhole in the Boulia District, where the Pelican (*Pelecanus conspicillatus*) is known to frequent, the hunter will

sit in the water in ambush, under cover of the bushes or suitable overhanging trees, etc., and throw empty mussel (*Unio*) shells one after another to some considerable distance on the water. The bird thinking these are fish 'jumping' on the surface, comes closer to inspect; at the same time the concealed and otherwise immovable individual taps the water with his fingers to mimic fish splashing. The Pelican more and more convinced of the plenteous supply of fish in and around these very same bushes, etc., swims more and more into danger, and when arrived close enough, is either hit with a boomerang or sometimes even caught with the hands. On the Upper Georgina River Pelicans are caught at night when asleep on the banks—the hunters, their bodies greased with ashes, and heads covered with bushes, the better to conceal themselves in the darkness, will noiselessly swim up to the unsuspecting birds and easily dispatch them.*

From Copmanhurst, Clarence River, New South Wales, Mr. George Savidge writes me:—"The Australian Pelican (*Pelecanus conspicillatus*) may be observed in all parts of the Clarence River. It is plentifully distributed about the waters of the Lower Clarence, also odd ones along the whole length of the river. At Yamba I have seen very large flocks, especially in the shallow waters of the lake there; in places they are quite tame, and come after the fishermen have hauled their nets for any fish, etc., that are left ashore. It is amusing to see them congregated on some spit, where one or two of the older birds seem to dominate the rest. They have a very wobbling gait on land, but they are most perfect flying machines when once mounted in the air. I have never seen or heard of their breeding on the Clarence River."

The late Mr. K. H. Bennett, writing from Mossgiel, New South Wales, in 1884, remarked:—" *Pelecanus conspicillatus* is very numerous on all the permanent lakes and lagoons in good seasons in the creeks and swamps on the plains. Its food does not consist exclusively of fish, for those I have shot in the cane swamps had their pouches crammed with tadpoles and aquatic insects. I have never known of an instance of its breeding here."

In the Australian Museum Collection are eggs taken by Mr. John K. Mackie, on Tolarno Station, Menindie, and at Lake Boolaboulka, in South-western New South Wales, in October, 1894. Of this lake a writer remarks:—"This fine body of water is a striking illustration of the beneficial changes in the direction of water conservation which can be effected in the Western District by means of a comparatively trifling outlay. Lake Boolaboulka, like Lake Menindie, is really a depression in otherwise flat country surrounding it, which is filled with overflow waters from the Darling River when in flood. In former years the water used to drain back as soon as the flood had subsided, and the droughts soon dried up the little remaining water. This has been remedied by damming the inlet, so as to maintain the lake at its flood level, the consequence being that there is now a handsome sheet of permanent water, about seven miles in length. Lake Boolaboulka is notable for its large flocks of Pelicans, which have their headquarters on an island about six hundred acres in extent. This is said to be the only spot on which Pelicans breed in New South Wales."

Relative to Plate A. 17, reproduced from a photograph by the late Mr. H. P. C. Ashworth, the latter wrote me from Melbourne, Victoria:—"I had great trouble to get a satisfactory picture of the group of young Pelicans, owing to their habit of huddling together. Whether it was for warmth or through fear I do not know, but the persistency with which they kept together was very striking. The seaman who was with me tried to arrange them while I watched for a favourable opportunity to snap them, but as soon as he would separate one of them it would make a rush back to the others. Their natural grouping seems to be in a circle, with the heads all tending to the centre. This photograph was taken on the 8th March, 1899."

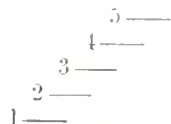
From Blackwood, South Australia, Mr. Edwin Ashby writes me:—"At the end of August, 1900, I saw a flock of Pelicans, several hundreds in number, between Lake Alexandrina and

* Syd. Morn. Her., 14th May, 1896.

Lake Albert, near the mouth of the Murray River, in South Australia. A small flock may usually still be seen near the mouth of the Port Adelaide River."

From Abbotsford, Melbourne, Victoria, Mr. Joseph Gabriel wrote me as follows:—"On 26th October, 1895, while waiting for a chance to land on Albatros Rock, in company with the late Mr. H. P. C. Ashworth, we managed to get on to Penguin Island, a little islet lying a few miles to the south-east of the West Hunter Group, off the North-western Coast of Tasmania, and here we found the Pelicans and their nests. The rookery was a small one, their being about eight or ten birds nesting, and the space was fringed with tall tussocks of grass, which hid the birds nicely from seaward; the birds were very timid, and made off at our approach. The nests were mere apologies, a few sticks and scraps of grass on the bare ground; we found one, two and three eggs in the nests. As we left the island we saw the Pelicans return from the sea. The too frequent visits of Naturalists caused these birds to leave this rookery, as they were absent the following two seasons, but I heard that they returned and have been seen breeding the last few years.

"During one of our trips to Western Port, Victoria, I had the opportunity of seeing Pelicans catching fish. Five of them were standing in a row slantways from the bank, the deeper one being in about six inches of water, thus:—



Number one would thrust down his beak, two would follow, then three, four, five in succession; they worked quite systematically and satisfactorily no doubt, for they kept at it the whole time I was passing."

Mr. G. A. Kearnland writes me from Melbourne, as follows:—"The Pelican appears to be equally at home on the sea coast or fresh water lakes or rivers. I have seen them at the mouth of the Yarra River, standing with wings outstretched for a length of time, whilst their plumage was drying. On the Fitzroy River, West Kimberley, North-west Australia, over one hundred miles inland, a large flock standing on a sandbank resembled a collection of tombstones, as they remained motionless, perfectly erect, with their bills hanging down their breasts. When flying they often form into two lines, joined like a letter V. To the south of Victoria they breed on several islands in Bass Strait."

While resident at Point-Cloates, in North-west Australia, Mr. Tom Carter wrote me:—" *Pelecanus conspicillatus* is fairly common on large inland pools and salt water creeks on the coast. They breed regularly on Pelican Island, in Shark Bay, and the natives informed me they used to breed on a small island in Exmouth Gulf."

Dr. Lonsdale Holden, while a resident of Circular Head, Tasmania, wrote me as follows:—"On the 8th October, 1886, Mr. E. D. Atkinson visited a Pelican rookery near the Hunter Group, lying off the north-west coast of Tasmania, and obtained a number of nests with eggs. The nests were on the highest part of the island, and although each one was made separately they were all close together. They were very flat and consisted of a mere bed of dry herbage, about fifteen inches in diameter, and without much grass around them, the rest of the island being covered with a dense scrub. There was much dry excrement around the nests, emitting an unpleasant odour. The birds would not admit an approach within gunshot, and flew right away after a few circles overhead. There were about twelve nests, and each contained two fresh eggs. On the 2nd November, 1886, I waded off to Pelican Island, Woolnorth, at low water; a number of Pelicans and Black Swans swam away as we drew near, and remained about a quarter of a mile from us. There were thirteen nests altogether, containing seventeen eggs, three in

one nest, in others two, or one, and one nest was empty. All the nests were close together, within the area of a small room, and were roughly arranged collections of herbage, part green, part dry, very shapeless, and the herbage was depressed as if cows had been lying on it, the ground emitting a disagreeable smell, apparently from the excrement of the birds. The eggs varied from pure white to dirty reddish-brown, and were all fresh. This island is some three or four miles inshore of Penguin Island, where Mr. Atkinson took the eggs previously referred to, and we supposed it was the same colony of birds, seeking a fresh breeding place, for previously they were not known to lay where he found them. Early in December, 1888, a Circular Head boatman found a number of well grown young Pelicans on Penguin Island, and in one nest a half grown chick. The flight of the Pelican is an alternation of wing strokes and sailing with fixed open wings a short distance. When they rise from the ground they take a few little hops before they take wing, so as to gain impetus. They will fly round and round, gradually rising upwards when disturbed, and then make off as if they had worked air into their bodies, and when made buoyant enough set forth on their journey. In June, 1890, a Pelican was caught in the bush by a party of surveyors, about ten miles inland from Circular Head. In September of the following year one was found dead, crushed between the side of a ketch and the wharf at Circular Head."

Again from Tasmania Mr. R. N. Atkinson writes me :—" On the 2nd October, 1905, during a trip to the Hunter Islands, Bass Strait, my father and I found a small colony of *Pelecanus conspicillatus* breeding on Penguin Island, the nests occupying a low-lying rocky point, only a few feet above and back from the sea. As we came upon the scene the parent birds flew off to a safe distance, and remained on the water until after we were gone. The nests were placed about a yard apart, and on an average measured two feet in outer diameter and inside twelve inches across by three inches deep, but they varied in outside measurement according to the nature of the site chosen. They were built of dried stems of some local plant, and lined with tussock grass. Some contained two young birds or a young one and an egg, others only a young one or a single egg. In one or two instances, where two birds occupied the same nest, one was some days (possibly a week) older than the other; one new arrival who succeeded in slowly and laboriously climbing from its own nest into another containing a more advanced downy covered chick, met with an unkind reception, and would probably have been killed had I not come to the rescue. They seemed very disagreeable, and ready to quarrel with any intruder. Some small fish were lying in or near the nests, and one young bird was making vigorous but vain attempts to swallow one sideways. My father, in company with Mr. W. J. T. Armstrong, again visited this island on the 3rd November, 1909, when most of the nests contained a single fresh egg. On this occasion the nests were composed wholly of tussock grass, the other vegetation having recently been destroyed by fire. Since the fire the island has become chiefly a mass of drifting sand, and the Mutton Bird rookery has almost entirely disappeared."

The eggs are usually two or three in number for a sitting, sometimes only one, varying in form from an ellipse to an elongate-oval, some specimens being considerably pointed at the smaller end. They are of a dull white or dirty yellowish-white, the shell being thickly and often irregularly coated with lime, and usually much nest stained or soiled by the feet of the sitting bird. A set in the Australian Museum Collection of three eggs, received in exchange from Mr. J. H. Mellor, and taken by him on the Coorong, along the South Australian coast, on the 1st October, 1894, measure respectively :—Length (A) 3.58 × 2.27 inches; (B) 3.38 × 2.3 inches; (C) 3.53 × 2.2 inches. A set of two taken by Dr. L. Holden, on the 2nd November, 1886, on Penguin Island, measures :—Length (A) 3.6 × 2.17 inches; (B) 3.6 × 2.23 inches. Another set of two taken by him on the same date measures :—Length (A) 4.02 × 2.2 inches; (B) 3.72 × 2.52 inches.

The breeding season in Eastern Australia and Tasmania usually commences at the latter end of September, and continues until the end of March.

EXPLANATION OF PLATE A. 16.

Breeding colony of Gannets (*Sula serrator*) on Cat Island, Furneaux Group, Bass Strait. Reproduced from a photograph taken by the late Mr. H. P. C. Ashworth.



EXPLANATION OF PLATE A. 17.

Young Pelicans (*Pelecanus onspiellatus*). Reproduced from a photograph taken by the late Mr. H. P. C. Ashworth.



AUSTRALIAN MUSEUM, SYDNEY.

P.

SPECIAL CATALOGUE, No. 1.

NESTS AND EGGS OF BIRDS

FOUND BREEDING

IN

AUSTRALIA AND TASMANIA,

BY

ALFRED J. NORTH, C.M.Z.S.,

*Colonial Member of the British Ornithologists' Union, Corresponding Fellow of the American
Ornithologists' Union.*

ORNITHOLOGIST TO THE AUSTRALIAN MUSEUM.

(SECOND EDITION OF CATALOGUE No. XII., ENTIRELY RE-WRITTEN,
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VOLUME III., PART I.

CONTAINING PAGES 1-80. PLATE A. 14.

ISSUED . . . 7TH MARCH, 1911.

Printed by order of the Trustees of the Australian Museum.

R. Etheridge, Junr., J.P., Curator.

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1911.

PART I. of Volume III. is issued herewith. It was intended to publish 120 pages, about one-third of the Volume, but insufficiency of paper has prevented this. It contains the Family Cuculidæ and the Sub-Family Centropodinæ, forming the concluding portion of the Order Picariæ; the Family Loriidæ and portion of the Family Cacatuidæ of the Order Psittaci. As in the previous Parts, the illustrations of birds are reproduced from drawings made by the late Mr. Neville Cayley, who was also responsible for hand-colouring the plates of eggs in the coloured copies. Most of the figures of eggs of the Family Cuculidæ have been published in previous Parts. The eggs of the different species of the Order Psittaci, all being white, no Plate of Australian Birds' Eggs is issued with this Part. The first twenty-four pages were printed off during Mr. North's absence at Lord Howe Island, consequently he had no opportunity of revising the proofs. Part II. is already in the Printer's hands, and will be gone on with immediately on the receipt of the paper, which it is anticipated will be in about a month's time.

R. ETHERIDGE,

AUSTRALIAN MUSEUM, SYDNEY,

CURATOR.

7th March, 1911.

AUSTRALIAN MUSEUM, SYDNEY.

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Herewith is issued Part II. of Volume III. It contains the remaining portion of the Family Cacatuidæ, comprising part of the Sub-family Cacatuinæ and the Sub-family Calopsittacinæ, the Family Psittacidæ, containing the Sub-families Palæornithinæ and Platycercinæ, and forming the concluding Australian portion of the Order Psittaci. As in the previous Parts, the illustrations of birds are reproduced from drawings made by the late Mr. Neville Cayley, who was also responsible for hand-colouring the plates of eggs in the coloured copies. The eggs of the different species of the Order Psittaci all being white, no Plate of Birds' Eggs is issued with this Part. Part III. is in the Press.

R. ETHERIDGE,
CURATOR.

AUSTRALIAN MUSEUM, SYDNEY,

27th July, 1911.

AUSTRALIAN MUSEUM, SYDNEY.

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ORNITHOLOGIST TO THE AUSTRALIAN MUSEUM.

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