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# The Emu

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Editors } J. A. LEACH, D.Sc., Col. M. B.O.U.  
          } CHARLES BARRETT, C.M.Z.S.

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THREE-QUARTERS NATURAL SIZE.

# The Emu

Official Organ of the Royal Australasian Ornithologists' Union.

"Birds of a feather."

VOL. XV.]

1ST JULY, 1915.

[PART I.

## On the Comparative Osteology of *Orthorhamphus magnirostris* (the Long-billed Stone-Plover).

BY DR. R. W. SHUFELDT, F.A.O.U., Hon. Member R.A.O.U.,  
C.M.Z.S., &c., WASHINGTON, D.C.

THIS great Plover-like bird is known in Australia as the Long-billed Stone-Curlew, being carried on the Check-list of the Royal Australasian Ornithologists' Union as *Esacus magnirostris*, where its range is stated to be "North-Western Australia, Northern Territory, and North Queensland." It is further known to occur, according to Sharpe ("Hand-list of Birds," vol. i., p. 173), in the "Bismarck Archipelago, and north to Borneo and islands of Bay of Bengal." This author, in the work cited, recognizes seven sub-orders as composing his Order (XV.) CHARADRIIFORMES, a group containing all the true limicoline birds, with a number of their congeners, as the *Otididæ* and others.

Sub-order VI. is created to contain the *Edicnemi*, or the Thick-kneed Plovers, which are arrayed under four genera—namely, *Edicnemus*, *Burhinus*, *Esacus*, and *Orthorhamphus*. Of all these, only two species occur on the Australian continent, and these are *Burhinus grallarius* and the subject of the present paper. In the R.A.O.U. "Check-list," the former species is listed as *Edicnemus grallarius*, and is known as the Southern Stone-Curlew.\*

The principal writers on the birds so far mentioned have been Linnæus, Temminck (the genus *Edicnemus*), Illiger (the genus *Burhinus*), Lesson (the genus *Esacus*), Salvadori (the genus *Orthorhamphus*), and some twelve other ornithologists who have described species included in these four genera. Sharpe includes them all in the family *Edicnemidæ*, which is doubtless quite a natural group.

As belonging in this group, Lydekker describes the extinct fossil form *Milnea gracilis*, from the Lower Miocene of France

\* Gould, "Birds of Australia," vi., Plate V.; Handbook, ii., p. 210. Plate VI. of this work is devoted to *Orthorhamphus magnirostris*, but it is, in my judgment, not a particularly good figure, and I have compared it with a number of fine skins of the species in the collection of the U.S. National Museum. These were placed before me by Mr. J. H. Riley, of the Division of Birds of that institution, to whom I am likewise indebted for favours in connection with attending to my needs with respect to the skeletons selected for comparison.

("Cat. Foss. Birds," p. 169, 1891), based on material which I have not had the opportunity to examine.

The genera *Burhinus*, *Esacus*, and *Orthorhamphus* contain only a single species each, while in *Edicnemus* about ten are recognized, and these occur in nearly all parts of the world with the exception of North America.

So far as I am aware, there has been no detailed description published of the osteology of *Orthorhamphus magnirostris*, and certainly not one in which its skeleton is compared with skeletons of its relatives, either near or remote. There is a very perfect skeleton of this bird in the collection of the United States National Museum, apparently from an adult male (No. 19,649), and I am indebted to Dr. Charles W. Richmond, Assistant Curator of the Division of Birds of that institution, for the loan of it for the purposes of study and description. In this connection Dr. Richmond also placed at my disposal a large number of skeletons of other species of birds, with which the osteology of *Orthorhamphus* should be compared. Such a comparison seemed to be desirable, and, having been undertaken by me, it is now set forth in the present article, which I trust will be found useful to students of the osteology of birds.

*The Skull.*—This part of the skeleton of the form here being considered is of unusual interest on account of the characters it exhibits being found in the skulls of various birds which represent entirely different families.

Viewed upon superior aspect, and starting at the superior margin of the occipital area, it is to be observed that the *crotophyte fossæ* are deep and broad. Their mesial ends, which are rounded, do not meet in the middle line by at least five millimeters. Either depression, when followed toward the side, increases in width, extending finally from beneath the post-frontal process to include the entire superior margin of the boundary of the osseous meatus. These *crotophyte fossæ* are very characteristic, and differ in the skulls of representatives of various species and groups of birds. *Edicnemus bistriatus* probably has them formed in the same way, as a mutilated skull at hand so indicates (No. 90,996, Coll. U.S. National Museum), while in more or less typical Plovers these depressions are very shallow, and restricted to a limited area at the sides of the cranium. (*Squatarola squatarola*, 19,015, Coll. U.S. Nat. Mus.; *Belonopterus chilensis*, 18,546, Coll. U.S. Nat. Mus.; and many others.)\*

\* Shufeldt, R. W., "Observations upon the Osteology of *Podasocys montanus*," Journ. Anat. and Phys., Lond., Oct., 1883, v., 18, Part I., pp. 86-102 (see figs. 1-4 of the plates). Garrod, Alfred Henry, "On the Value in Classification of a Peculiarity in the Anterior Margin of the Nysal Bones in Certain Birds," P.Z.S., 1873, pp. 33-38. Also Coll. Sci. Papers, p. 124, figs. 1-11. The figures illustrate superior views of the skulls of *Alca impennis*, *Larus argentatus*, *Numenius arquatus*, *Columba livia*, *Parra (Hydralector) cristata*, *Arctica alle*, *Pedionomus torquatus*, *Otis tarda*, *Gallus domesticus*, *Daption capensis*, and *Coccothraustes vulgaris*, which are here arrayed in the order in which Garrod numbered them in his paper. Although illustrating another osteological point, they are very useful as showing the

The point here to be noticed, however, is that they are, among others, deep in *Larus* and other Gulls, and in probably other typical longipennine birds, in all of which they approach each other mesially, having but a small interval between them, while in *Chiornis*, Plovers, and the Oyster-catchers (*Hæmatopus*) they are restricted in area and situated laterally.

Passing forwards to the parietal region or vault of the cranium, it is to be noticed in *Orthorhamphus* that there is here a rounded, median, longitudinal groove, extending from the supra-orbital glandular depressions backward to a level area, just beyond the interval between the crotaphyte fossæ. This groove is practically what is found, too, in the *Laridæ* and others, while it is almost entirely absent in *Chiornis*, *Hæmatopus*, and others, and quite so in most Plovers. In these latter birds there are no "parietal eminences," which are well marked in *Orthorhamphus*, *Larus*, and in some other Gulls, but not in all, as they are absent in *Rissa*, a species in which only the lateral boundaries of the aforesaid median groove are elevated.

From the parietal region forwards, to include the remainder of this aspect of the skull, the characters vary in no small degree throughout all of these genera of birds. In *Orthorhamphus* the vaults of the orbital cavities are considerably raised above the mesio-frontal area of the skull, and, omitting either lacrymal bone, the free margin of each is notably sharp, and continues to be so to the very apex of the post-frontal process. The orbital roof on either side is perforated by a few scattered and minute foramina, and these are far less evident in *Edicnemus*, while in *Squatarola squatarola* they are confined to a circular foramen of some size, on either side, being situated well within the orbital margin just beyond the parietal region of the cranium. In most Gulls these foramina again are small and scattered, while in *Chiornis* and the Oyster-catchers they are arranged in a row upon either side and well within the orbital margin. As I have elsewhere shown, they vary considerably throughout the *Limicolæ*.\*

In the mesial area of the frontal region of the skull of our subject, on this its dorsal aspect, there is to be seen the very con-

character of the "crotaphyte fossæ" in the skull figured. It will be observed that these concavities are nearly absent in *Gallus*, *Coccothraustes*, *Columba*, *Parra*, and *Pedionomus*, while they are separated by a large interval in *Numenius* and *Otis tarda*, coming more or less closer together in *Larus*, in the Great Auk, and in *Daption*.

\* Shufeldt, R. W., "Osteology of *Numenius longirostris*, with Notes upon the Skeletons of Other American *Limicolæ*," Journ. Anat. and Phys., Lond., Oct., 1884, pp. 57-82, Plates IV., V. (see Plate V., fig. 1b). This paper describes and compares the characters of a number of limicoline birds, which descriptions will repay examination in connection with what is set forth in the present contribution.

Coues, Elliott, "Birds of the North-West," Govt. Printing Office, Washington, D.C., 1874, pp. 592-602. We have here a brief, though good, account of the osteology of the *Laridæ*, wherein the superior frontal regions of the skull in several genera of the *Longipennes* are compared, and the facts noted may, with advantage, be taken into consideration with the present study of the skull of *Orthorhamphus*.

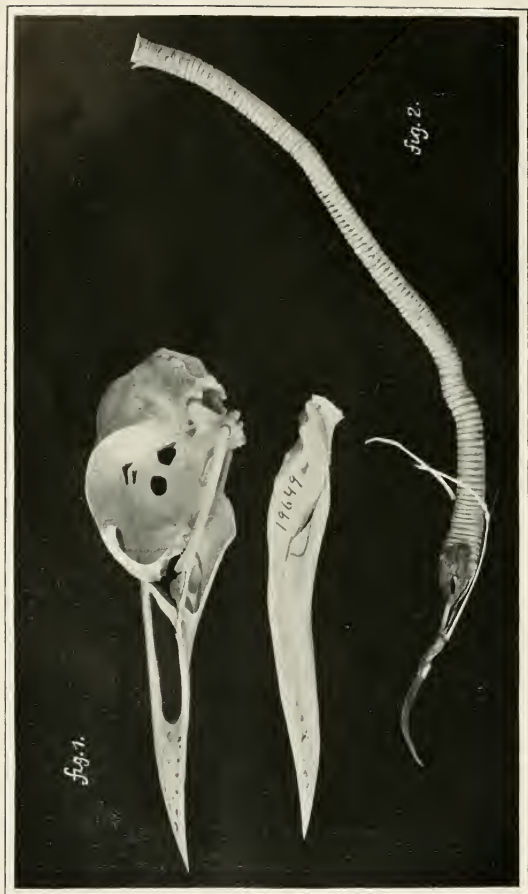
spicuous *supra-orbital glandular depressions*; they are quite unlike those concavities as they occur in the skulls of any of the birds before me at this writing, and, moreover, they differ widely from what we find in *Ædicnemus*, in which latter form they are shallow, well separated in the median line, curve outwards anteriorly, and, finally, each depression terminates near the fronto-lacrymal suture, on its own side, in a foramen of no great size.

Now, in *Orthorhamphus magnirostris* these depressions meet for their entire lengths in the middle; they are unusually deep, being rounded posteriorly and truncated in front, each terminating anteriorly in a large, single elliptical foramen, situated between the frontal and lacrymal bones. These are well shown in fig. 7 of Plate II., and it is to be observed that, laterally, these concavities are far removed from the orbital margins, which is also the case in the skull of *Ædicnemus bistriatus*. In some true Plovers, however, as is the case in *Squatarola*, these glandular depressions are very shallow; they meet mesially in the frontal region, each to curve outwards behind, in which locality alone they do not approach the orbital margins. Here the lacrymo-frontal foramina are mere notches, while, as already remarked above, a pair of foramina are found over the middle of the orbits, one upon either side. (Compare figs. 16 and 18 of Plate VI.)

In the Chilean Lapwing Plover (*Belonopterus chilensis*, fig. 15, Plate VII.), the character of these depressions is again entirely different. Each consists of a distinctly defined, long, and narrow concavity, with a single small foramen at the extreme anterior end. A considerable interval separates them in the median line, and each is very slightly curved, the concavity of which is toward the sharp, free margin of the orbit. They are almost identical in their morphology in the Kittiwake Gull (*Rissa t. tridactyla*) and in the Black Oyster-catcher (*Hæmatopus niger*), where they are more or less shallow, meet in the middle line, extend to the free peripheries of the orbits, and to the external apices of the lacrymals. In *Rissa* they do not extend very far posteriorly, while in the Oyster-catcher they are continued on either side to the tip of the post-frontal process. We find their characters the same in *Larus glaucus* and other Gulls, while in *Larus argentatus* they are separated in the middle line (No. 18,204, Coll. U.S. Nat. Mus.) *Ædicnemus bistriatus* has them short and broad, separated mesially; and a single foramen is situated far forwards in each of these shallow cavities (fig. 18, Plate VII.) They are entirely different in *Chionarchus minor*, as is shown in fig. 14 of Plate VII., and, as I have elsewhere shown, they depart in their characters in this bird from any other form ever examined by me in the entire Class *Aves*.\*

\* Shufeldt, R. W., "Contributions to the Comparative Osteology of Arctic and Sub-Arctic Water-Birds," Part I., Journ. Anat. and Phys., Lond., Oct., 1888, vol. xxiii.; n.s., vol. iii., pp. 1-39, Plates I.-IV., 40 figures. Many of the skulls here figured should be compared with the skull of *Orthorhamphus magnirostris*. These "Contributions" ran through in nine parts (Oct., 1888-91), and contain many descriptions and figures of skeletons of





If one will compare fig. 7 of Plate II. of the present article with figs. 14 to 19 inclusive of Plate VI., it will readily be appreciated that the *lacrymal bones* are morphologically very different in all of the skulls of the birds so far noticed.

Either *lacrymal* in *Orthorhamphus magnirostris* does not appear to fuse or ankylose with any of the bones surrounding it with which it articulates. Mesially, it forms in this species the antero-external periphery of the large, ellipsoidal foramen, at the distal termination of the supraoccipital glandular depression, while its postero-external angle juts out beyond the superior free margin of the orbit. It is convex on its dorsal or superior surface, and correspondingly concave below, where it forms a part of the roof of the orbit in front. Its descending process is first directed inwards, then outwards, to terminate in a triangular, expanded free extremity that barely clears the infra-orbital bar. The middle part is slender and directed posteriorly, and it is there we find the pneumatic foramen entering on its anterior aspect (fig. 1, Plate II.) Anteriorly, it makes an extensive and close articulation with the nasal bone of the same side.

A lacrymal bone in *Edicnemus bistriatus* essentially agrees in form with that element of the skull as I have just described it for *Orthorhamphus*, while in other particulars it is quite different: for, in the first place, it is stouter; it fuses with all the bones it comes in contact with, the sutures being practically obliterated; and, finally, it may or may not form part of the periphery of the small foramen in the concavity for the supra-orbital gland.

*Belonopterus chilensis* possesses lacrymal bones much as we find them in *Edicnemus bistriatus*, with the exception that the descending portion of either one of them is far more slender, and may be in contact with the outer margin of the pars plana. Moreover, it does not reach down so far toward the zygoma, and midway on its anterior border it develops the fine little spicula of bone, pointing forwards, which is found in the same locality in various other true Plovers. This little spine is well shown in Professor Huxley's figure of the side view of the skull of *Charadrius pluvialis*, cited above. (Fig. 7.)

birds that would repay comparison with the skeleton of the subject of the present paper. (Part IX. gives a full account of the skeleton of *Chiornis minor*.)

Shufeldt, R. W., "On the Affinities of *Aphriza virgata*," Journ. Morph., Boston, Nov., 1888, vol. ii., No. 2, pp. 311-340, Plate XXV. Gives figures of the bones of the skeleton of this bird, which has some affinities with the Plovers.

Huxley, Thos. H., "On the Classification of Birds, and on the Taxonomic Value of the Modifications of Certain of the Cranial Bones Observable in that Class," P.Z.S., Lond., 1867, pp. 415-472, Figs. 1-36. Parts of the text and several of the figures refer to Plovers and Gulls, which may be of advantage by way of comparison in the present connection. Professor Huxley evidently had before him a skull of *Charadrius pluvialis*, in which the foramen at the anterior end of the supra-occipital glandular depression of the right side was incomplete, its periphery on the outer side being non-continuous; this having been caused by its encroachment upon the margin of the orbit. The foramen on the left side is entire (figs. 7 and 8).

Oyster-catchers (*Hæmatopus*) have their lacrymal bones very much as they are in certain *Laridæ*, though their upper portions project more prominently, and the descending limb of either of these bones is much stouter, making a more extensive union with the side of the pars plana. As viewed from above, this agreement is well shown in figs. 17 and 19 of Plate VII. of the present paper, and there, too, will be seen, on the same aspect, the lacrymals in *Chionarchus*, *Squatarola*, and others, each and all of which I have described in former osteological papers.

One of the most interesting features of the skull in these big, Plover-like birds is the *superior mandible* (fig. 1, Plate II.; figs. 5 and 6, Plate III.; fig. 18, Plate VII.) Measuring along the culmen, from the cranio-facial hinge to the apex, in *Orthorhamphus*, it is seen to have a length of 7 centimeters, whereas this same length in *Ædicnemus bistriatus* measures but 5.3 centimeters. In both skulls the narial apertures are large and elongo-elliptical in outline, while both differ from all the true Plovers, Gulls, Oyster-catchers, and numerous other limicoline and larine species in being *holorhinal birds*, and not *schizorhinal* ones. The holorhinal conformation of the nasal bones, in the case of *Ædicnemus*, has long been known, and on that account probably suspected in the case of *Orthorhamphus*, though the fact has not heretofore been published.\*

In *Orthorhamphus*, the superior mandible is not only of large size, very long and tapering, but it is likewise somewhat decurved, with rounded culmen and cultrate tomia. Most Plovers, on the other hand, have the upper mandible and the dentary portion of the jaw nearly straight, with the narial openings extended to within a short distance of the apex in the upper bill. This is the case with a good many of the *Limicolæ*.

Turning to the basi-cranial region of the skull of the bird here being considered, it is at once apparent that in all of its general characters it far more closely resembles the corresponding part of the cranium in an average Gull—*Larus argentatus*, for example—than that of any Plover that I have ever examined or compared it with. Indeed, all this part of the cranium in *Orthorhamphus* is almost typically larine in its morphology.

Most all Plovers (*Squatarola*, &c.) have present the "supra-occipital foramina," one on either side of the supra-occipital prominence. These are small in the Chilean Lapwing, but of good size in the Golden Plover and others. In *Orthorhamphus* they are entirely absent.

\* Forbes, W. A., "Coll. Sci. Mem.," pp. 189-213, figs. 1 and 2. This talented avian anatomist, who died at Shonga, Africa, many years ago (1st January, 1883), here says that "Birds belonging to the *schizorhinal* group are nearly all, with the exception of *Platalea* and *Ibis*, 'schizognathous,' as regards their palate. The 'Schizorhina' comprise the following minor groups:—*Columbidæ*, *Pterochlidæ*, *Turnicidæ*, *Parridæ*, *Limicolæ* (except *Ædicnemus*, which is holorhinal, herein agreeing with the Bustards), *Laridæ*, *Gruvidæ*, *Eurypygidæ*, *Rhinochetidæ*, *Plataleidæ* (the *Hemiglottides* of Nitzsch), and *Alcidæ*." He also pointed out that *Mesites* and all the *Rallidæ* are *holorhinal* birds.

Anteriorly, the very spacious auricular cavity is better protected by a thin, osseous wall in our subject than in *Rissa* or in *Larus*; while posteriorly in *Orthorhamphus* there is thrown out, laterally, a delicate, transverse, osseous brace, which, when the quadrates are duly articulated, meets, on either side, the wall of the ear cavity, opposite their middle portions. For the left side, this brace shows fairly well in fig. 5 of Plate II.

All this part of the cranium in the skull of *Ædicnemus* at hand has been cut out and thrown away by the taxidermist who made up the skin of the specimen; so, unfortunately, I am unable at present to make the necessary comparisons with the skull of that species.

Anteriorly, the mesial, apical portion of the basitemporal area underlaps the entrances to the Eustachian tubes, the latter standing pretty well apart. This is likewise a Gull character; while in the Plovers those openings to the middle ear, on either side, are not so protected, and in them they may be seen upon a direct basal view of the skull.

*Orthorhamphus*, *Hæmatopus*, *Larus*, and others have a large *foramen magnum*, which is nearly circular in outline; in the typical *Charadriidæ* its longitudinal axis is generally longer than the transverse one.

This Long-billed Stone-Curlew of Australia possesses pterygoids at the base of its skull, which differ entirely from those found in the typical *Limicolæ*. Either bone is flat ventrally, sharp and thin dorsally, slightly twisted upon itself, does not meet the fellow of the opposite side in articulation, and *lacks entirely* any basi-ptyergoid processes. In *Larus* and other *Longipennes* the pterygoid is more slender, markedly straighter, and does articulate anteriorly with the fellow of the opposite side in life.

There are no basi-ptyergoid processes among the Gulls, Terns, and their near allies. Plovers have their pterygoids very short; they usually do not meet each other anteriorly in articulation, and basi-ptyergoid processes are strongly developed throughout the typical *Limicolæ*. I find them present in *Hæmatopus*, *Charadriidæ*, *Numenius*, and in many allied species.

This being the case, the *ptyergoids* of *Orthorhamphus* and *Ædicnemus* are much more like those bones in Gulls, in *Chiornis*, and others than they are in birds belonging to the typical *Charadriinæ*: while, on the other hand, a *quadrate bone* varies but little throughout the typical *Limicolæ* and *Longipennes*, including these big Stone-Plovers. As an element of the skull, the bone is found to be large and bulky in all of them, with a very broad, flattened, quadriform orbital process. The major anterior portion of the facet for the mandible is placed transversely, and presents the usual facets for articulation with the mandible as cited above.

An *orbital cavity* in *Orthorhamphus* is notably capacious with respect to its size, and in this particular agrees better with pluvialine birds than with the *Laridæ*. This, however, does not apply to the inter-orbital septum separating these two cavities,

for in all these Stone-Plovers it usually presents but a single, *not large*, vacuity near its centre, while in typical Plovers the partition is quite deficient, in so far as it is preformed in bone.

Owing to the kind of lacrymal our subject possesses, the orbital roof is likewise more complete and protective, in so far as the eye is concerned, in the Stone-Plover, the Chilean Lapwing, and some limicoline birds than it is in *Larus*, *Rissa*, and some of their near congeners.

Most Gulls, Oyster-catchers, Plovers, Lapwings, &c., have more or less perfectly ossified *pars planæ* forming the anterior walls of the orbits; and it is interesting to note that this osseous partition, dividing, in a way, the orbit from the rhinal chamber, upon either side, is present in *Ædicnemus*, but entirely absent in *Orthorhamphus magnirostris* and in *Chiornis*, in which forms these wings of the mesethmoid are found to be only in membrane.

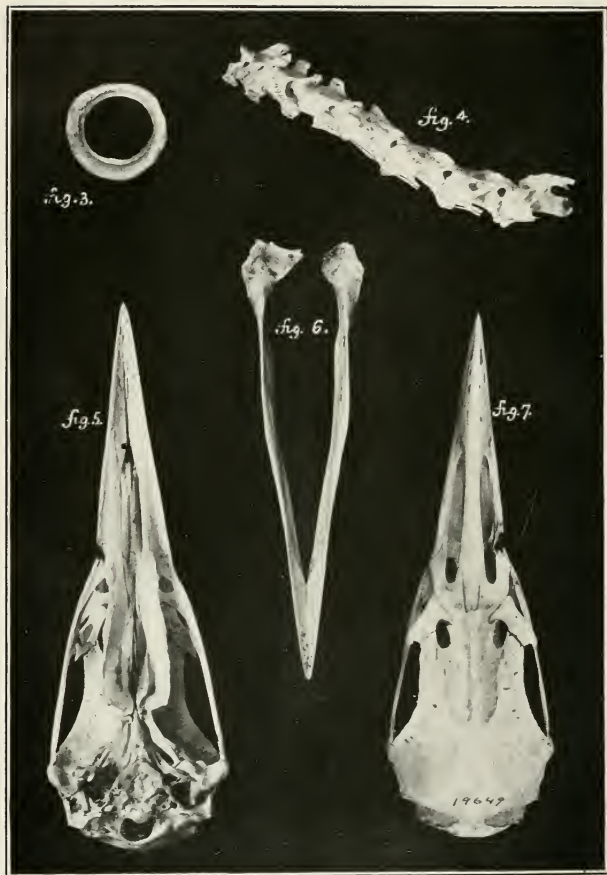
Owing to the formation of the crotaphyte fossæ, and the conspicuous post-frontal and squamosal apophyses with the deep valley between them, the entire facies of the lateral aspect of the cranium in *Orthorhamphus* comes closer to some of the Gulls than to any of the true Plovers. In *Ædicnemus bistriatus* the post-frontal process is very long and slender, almost reaching to the squamosal one below it; while in average Plovers, including the Lapwings (*Vanellus*, &c.), these lateral processes of the cranium are invariably short and inconspicuous, with the valley between them usually quite shallow.

The *zygoma* or *quadrato-jugal bar* is rather broad and compressed from side to side, its deepest part being the maxillary extremity, situated between the descending limb of the lacrymal and the nasal of the same side. This is the form of the infra-orbital bar in *Larus argentatus*, while in the typical Plovers (*Squatarola*, &c.) and the Lapwings it is very straight, slender, and uniform in its proportions, and its anterior extremity is in a much higher plane than the posterior (the long axis of the skull being held horizontally).

*Larus argentatus*, when adult, possesses, upon either side, an elongate, triangular flake of bone, about 7 millimeters long, which is attached by ligament to the hinder extremity of the descending limb of the lacrymal. It points directly backward, and is therefore parallel to the zygomatic bar. (Spec. No. 18,204, Coll. U.S. Nat. Mus.) I find no such ossicle as this in the skull of *Orthorhamphus*, nor in any of the typical *Charadriidæ*.

The free *vomer*, being bifid posteriorly, straddles the anterior sharp apex of the presphenoid. The bone is unusually long, laterally compressed, narrow from above, downwards, and carried, as it gently curves ventrad, to a bifurcated, sharp point in front. This agrees pretty well with what we find in *Ædicnemus bistriatus* and in the Oyster-catchers, in which last it is more evidently bifid anteriorly. With respect to *Larus*, beyond the presphenoid the vomer develops lateral wings of moderate width throughout, which are laterally disposed. These do not occur in our subject, nor in the *Charadriidæ*.





Either *palatine* is conspicuously developed, and when articulated as in life these bones do not quite come in contact in the middle line. The postero-external angle is completely rounded off, while up to a point opposite the lower end of a lacrymal, the inner and outer edges of one of these bones are turned downward, especially the mesial edge. This creates a moderate concavity on the posterior third of the bone; while beyond it they are flat, with the lower or ventral surfaces somewhat inclined toward the mesial plane. These bones make the usual articulations anteriorly, and with the premaxillary and the maxillo-palatines; and in the skull of the adult nearly all the sutural lines are obliterated, especially with the premaxillary in the roof of the mouth.

As well as I can judge from the mutilated skull of *Ædicnemus bistratus* at hand, its palatine bones agree quite closely with those of *Orthorhamphus*, though anteriorly they may be somewhat narrower. With some slight modifications, they also agree with the palatines as we find them in a great many of the *Limicolæ*, *Longipennes*, and their near congeners. (Fig. 5, Plate III.)

This agreement is also seen in the case of the *maxillo-palatines*, with the exception of the Oyster-catchers (*Hæmatopus*), in which genus, as I have previously shown, they are peculiar. In our subject, a maxillo-palatine nearly meets the scroll-like portion of the fellow of the opposite side in the middle longitudinal line, the vomer being well above the narrow interval between them. This interval is considerably wider in *Larus*, *Hæmatopus*, and most Plovers, and the vomer is more basally situated in them, thus bringing it into plainer view when the skull is regarded upon its ventral aspect.

The *maxillary* in *Orthorhamphus*, upon leaving the zygoma, is a thin, horizontal plate of bone; when half-way across to the scroll-like portion of the maxillo-palatine it bifurcates, and, the mesial ends expanding, the superior branch fuses with the superior margin of the scroll-like part, and the lower branch with the inferior margin of the same. This arrangement is quite different in Plovers, Gulls, Oyster-catchers, Turnstones, &c., as in these the osseous connecting bridge of the maxillo-palatine, on either side, is very short, and in some species quite inconspicuous.

Unfortunately, the *ossicula auditus* have been lost in the case of the skeleton of the species here being considered, so I cannot describe them. On the other hand, the *sclerotal platelets* of both orbits were saved (fig. 3, Plate III.) As is well known, the eyes in this bird are of great size; but these overlapping laminae of bones present nothing peculiar beyond the fact that they are very narrow in front, and gradually become wider and wider as we pass backwards, the posterior ones being markedly wider than those in front.

Passing to the *mandible*, we find it to be a bone presenting some interesting characters. In form, it is of the narrow, acute V-shaped pattern (fig. 1, Plate II.; fig. 6, Plate III.), with deep rami, and strong, bulky articular extremities. Viewed laterally,

it is seen to offer a double curve in its entire length. From posterior end to apex, on either side, this curve is upwards, downwards, and again upwards. The symphysis is extensive, having a length of 2.5 centimeters, being extensively concaved above and correspondingly convex below. Inferiorly, the margins are rounded off, and this is true of the osseous tomia above, all to the distal dentary part, where they become sharp. A slit-like vacuity occurs in the splenial space, and a centimeter posterior to it, in either ramus, there is a small, perforating foramen. This foramen is very large and conspicuous in *Larus argentatus*, but minute in Plovers.

As already stated, the articular extremities are thick and strong, with their hinder aspects of a triangular outline, the plane of the superficies being at right angles to the long axis of the bone.

The cranium and this mandible, together with the free associated bones, are nearly entirely pneumatic, and this is generally the case in the other forms here mentioned.

In the Chilean Lapwing (*Belonopterus*) the mandible possesses well-developed angular processes posteriorly, and this is the case, too, in *Squatarola*; while in most Gulls the mandible is very much like that bone in *Orthorhamphus*. In fact, this jaw would answer pretty well for some of the larger species of longipennine birds.

*The Hyoid*.—In this, the skeletal part of the lingual apparatus, we find extreme simplicity of structure. The anterior cartilaginous extension of the *glosso-hyal* is long (2.5 cms.) and narrow (average 1.5 mm.), terminating in front as a rather pointed tip. Basally it ossifies to a certain extent, forming a bone some 4 mm. long, and just large enough to accommodate the articulation for the *basi-hyal*. This latter is of quadrilateral outline, with the usual anterior, median process for the *glosso-hyal*, consisting of a short superior lip and a long inferior one. Posteriorly, its margin is transverse, and occupied by a median facet for the *free uro-hyal* or *basi-branchial*. On either side of this is the facet for the *cerato-branchial* of the *thyro-hyals* for the corresponding side.

Either *epi-branchial* ossifies all to a small part of its hinder end, and the *cerato-branchial* and *epi-branchial* taken together exhibit a considerable curvature, the first-named having a length of 3.2 cms. and the latter 2 cms., not including its cartilaginous part. (Plate II., fig. 2.)

In *Squatarola squatarola* no part of the *glosso-hyal* ossifies: the *basi-hyal* is narrow and elongate, and the *uro-hyal* co-ossifies with it. The *thyro-hyals* are extremely slender and long, agreeing, apart from their smaller size, with those elements of the hyoid in *Orthorhamphus*.

*Rissa tridactyla* (No. 18,169, Coll. U.S. Nat. Mus.) exhibits considerable difference in its hyoid, as compared with the limicoline species just noticed. In this Gull a large part of the *glosso-hyal* ossifies—that is, some 1.3 cms. of its posterior portion, and only about 8 mm. of its anterior tip remains in cartilage in the adult. The ossified part is elongate and narrow (V-shaped), being composed of two small rods of bone placed side by side and bridged

across posteriorly, so as to afford the articulation for the basi-hyal. This latter is short and triangular, with a posterior extension for the uro-hyal, which latter does not seem to co-ossify with it. The *cerato-branchials* are very long, while the *epi-branchials* are short, and only ossify near their distal ends.

The *trachea* (with its superior and inferior larynx) is of very simple construction, and it is not my intention to devote any special attention to it here.

There are one hundred and fourteen rings in the "windpipe" portion of it, and its anatomy, in so far as its general structure is concerned, is well shown in fig. 2 of Plate II.\*

*The Remainder of the Axial Skeleton* (fig. 8, Plate IV.)—*The Spinal Column*.—No little interest attaches to the number of vertebrae which normally occur in the vertebral spine in birds, especially when we come to compare such data in those species which belong to related groups. The significance of the information obtained may not always be at first apparent; but the time will arrive when it will be, for far in the future a day will come when we shall be in possession of a much wider knowledge of the morphology of birds than we now command.

In various published papers of mine upon avian osteology, there occur counts of vertebrae for many species among the waders and shore-birds. One or two of these may or may not occur in the following table, which contains representatives of the principal forms which have been taken into consideration in the comparative osteological study of *Orthorhamphus magnirostris*; in such connection it will prove to be useful.

TABLE.

Species.	Number cervical vertebrae without ribs.	Cervical vertebrae with free ribs.	Dorsal vertebrae.	Sacrales.	Free caudals to which the pygo-style is to be added.	Total.
<i>Orthorhamphus magnirostris</i> ..	13	14th, 15th	16-20	16	7	43
<i>Hæmatopus niger</i> ..	12	13th-15th	16-20	16	7	43
<i>Chionarchus minor</i> ..	13	14th, 15th	16-21	15	7	43
<i>Squatarola squatarola</i>	13	14th, 15th	16-21	14	7	42
<i>Belonopterus chilensis</i>	13	14th, 15th	16-21	14	7	42
<i>Rissa tridactyla</i> ..	13	14th, 15th	16-21	12	7	40
<i>Larus argentatus</i> ..	13	14th, 15th	16-20	14	7	43
<i>Arenaria interpres</i> ..	13	14th, 15th	16-20	12	8	40

\* Unfortunately, in the average museum specimens of birds' skeletons the hyoidean apparatus and the complete skeletal parts of the air passages are not to be found. It is largely the case in the present instance, and I find myself without the tracheæ of either a Gull or a Plover at hand.

This table goes to show that, in so far as the *number* of vertebræ in the spine is concerned, *Orthorhamphus* has, in common with an Oyster-catcher, with a Sheath-bill, and with a Gull, 43 vertebræ, while with their *divisional lines* it agrees with no one of them. Finally, the only two birds that do agree in this particular—both numerically and divisionally—are two Plovers, *Squatarola* and *Belonopterus*, and as Plovers they are not especially closely related.

In the cervical region of the spine in *Orthorhamphus* the vertebral artery, upon either side, is generously protected by extensive osseous walls, provided in the usual manner by each succeeding vertebra of the neck. There is no semblance of a vertebral canal, however, provided on the part of the *axis* or the *atlas*, and in life the artery would appear to pass from the anterior entrance of the vertebral canal of the third cervical, across the *axis*, to within the neural canal of the atlas, and thence into the cranial cavity.

Neurapophyses appear on the second to the fifth cervicals inclusive, being well developed on the atlas, but then gradually diminishing in size as we follow them backward. They appear again on the last three or four cervicals, small at first, until to include the last one, which is more or less like one of the neurapophyses of the dorsal vertebræ. (Fig. 4. Plate II., and fig. 8, Plate IV.)

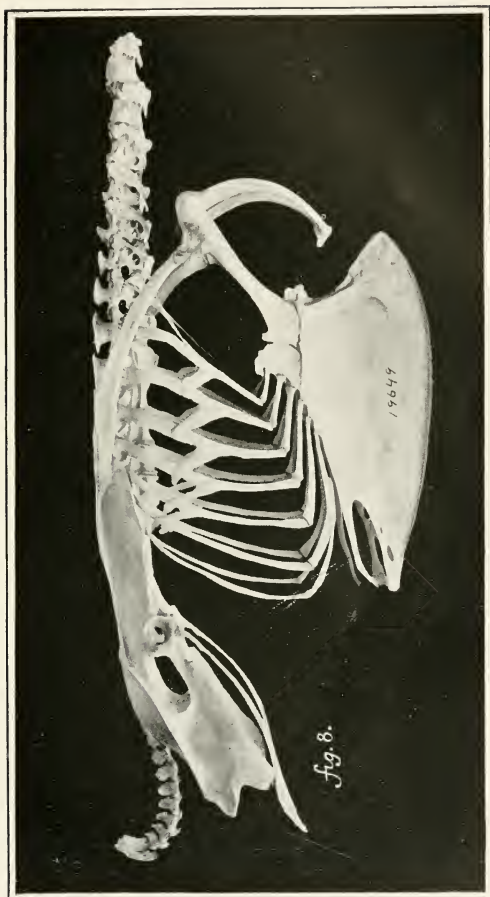
The *carotid canal* is open throughout its entire course, and the pleurapophysis, upon either side of it, is well developed.

The first *free cervical rib* is short, and more or less rudimentary; the second is long and very slender, lacking an unciform process.

All the *dorsal vertebræ* are freely articulated with each other, and this appears to be the case with all the birds mentioned in this paper. Their neural spines only come in contact with each other at the anterior and posterior extremities of their superior free and thickened margins. There they interlock in the usual manner through a pointed anterior ending and a bifurcated posterior one. These spines are quadrilateral in outline, their free anterior and posterior margins being concaved, thus forming elliptical vacuities between them, when duly articulated as in life.

Lateral processes of the dorsals are broad and flat, with all their accessory projections much reduced. Only the two leading dorsals possess hæmal spines, and they are not very conspicuously developed.

All the *dorsal ribs* and one pair of the sacral ribs—the first—bear *epipleural appendages*, and all are well developed with the exception of the sacral ones. These appendages overlap the succeeding ribs when articulated, and therefore materially add to the stability of the osseous thoracic walls. With respect to form, the ribs in *Orthorhamphus* are rather slender, and this likewise applies to the six pairs of hæmapophyses, which articulate with the costal borders of the sternum. Of these, the longest pair are those belonging to the first pair of sacral ribs: those belonging





to the very slender second pair of sacrals do not reach, on either side, the sternum, by at least a centimeter or more. (Fig. 8.)

*The Sternum* (fig. 8, Plate IV.; fig. 10, Plate V.)—In this bone we have an interesting combination of characters; and, while these are largely pluvialine, there is yet to be seen evident traces of larine ones. Quadrilateral in general outline, the bone has an extreme length of  $8\frac{1}{2}$  cms., and an average width of  $3\frac{1}{2}$  cms. An imaginary line, measured from the postero-superior angle of the small, sessile, quadrilateral manubrium to the angle of the deep and anterior projecting carina, measures 3.3 cms., while the keel itself has an extreme length of 9.1 cms.

Dorsally, this sternum is markedly concaved, and does not appear to be pneumatic, as the foramen just within the thickened anterior border, mesially, is absent. There is a large, elliptical one present in *Larus argentatus*, and a small one in the sternum of a Kittiwake (*Rissa*).

The sterna of *Chionarchus*, most Plovers, Oyster-catchers, and Turnstones and their allies are non-pneumatic, and the aforesaid foramen is absent.

*Orthorhamphus* has the costal processes of its sternum large and almost square in outline, the posterior border of either one of them affording space for well-separated transverse facets for the three leading costal ribs or hæmapophyses. The manubrium stands squarely between the transversely long coracoidal grooves, and the sharp mesial anterior edge of the former is carried half-way down to the carinal angle, the anterior border of the keel being much thickened here, while for the rest of the distance to the angle it is thin and sharp.

Passing to the posterior part of the body of the sternum (figs. 8 and 10), we find a long, very slender, external xiphoidal process on either side, which very nearly surrounds a large, elliptical xiphoidal opening. These lateral processes nearly close in, on either side, the opening posteriorly. Mesially, the midxiphoidal prolongation is transversely broad, terminating posteriorly in a transverse border. On the left-hand side of the keel this prolongation is pierced by two foramina—one small, antero-external circular one, and one, rather large, postero-external elliptical one. On the right-hand side there are two more—a very small, antero-external circular one, and a much larger circular one, situated at a little distance posterior to it.

As a rule, Plovers have their sterna profoundly twice-notched on either side of the sternal keel (*Squatarola*, *Charadrius*, *Lobivanellus*, &c.); this is also the case with *Hæmatopus*.

*Belonopterus chilensis* has large, external "notches" and much smaller internal foramina, this being reversed in *Larus argentatus*. *Chionarchus minor* agrees, in this particular, with *Rissa tridactyla* and probably with other Gulls, all of which proves that we must be quite cautious when we come to employ the morphology of the xiphoidal extremity of the sternum of birds as the sole character in tracing affinities in this group.

*The Pectoral Arch.*—All the bones composing this part of the skeleton in *Orthorhamphus* are strongly developed and of conspicuous size (fig. 8, Plate III., and figs. 9 and 10, Plate IV.)

When articulated, as in life, the *scapulae* extend several millimeters posterior to the anterior limits of the ilia of the pelvis; a *coracoid* exceeds in length half of the longitudinal axis of the body of the sternum; and the broad, U-shaped *os furcula*, with its small, peg-like hypocleidium, is, comparatively speaking, much stronger than it is in certain *Laridae* possessing a trunk skeleton of proportions equalling that of the present subject.

Below, the *os furculum* stands well away from the anterior margin of the sternum, being separated by at least a centimeter. Mesially, below, this bone is compressed from before, backwards, while the clavicular limbs above are flattened transversely. Superiorly, the distal end, on either side, makes a substantial articulation with the scapula, and a very extensive one with the head of the corresponding coracoid as it passes it. Thus, it will be seen that the formation of the *foramen triosscum* is very complete in *Orthorhamphus*.

As in Plovers and Gulls, but not in Oyster-catchers, the *coracoids* are separated from each other in their sternal grooves or beds by the posterior portion of the manubrium. At its lower part, either one of these bones is much compressed from before, backwards, and much expanded transversely. Both externally and mesially on this expanded portion below, there is developed an apophysis which, in either case, is directed upwards, almost parallel to the longitudinal axis of the bone. Of these two processes, the outer one is the larger, and is constantly present. The inner one appears to be an ossification of the ligament which is attached at the infero-mesial angle of the coracoid, and consequently may or may not be present, depending on the age of the individual. Indeed, as Dr. Gadow remarks, the "configuration of the various processes of these bones is manifold, and of great taxonomic importance, as has been exhaustively shown by Professor Fürbringer, in whose *Untersuchungen zur Morphologie und Systematik der Vogel* about one hundred figures of this articulation in different birds are given.\*

The precoracoidal process extends nearly half-way down the shaft, and is pierced below by the foramen for the supracoracoidal nerve, as in the *Strigidae* and some other birds, as many *Limicola* and *Laridae*.

For its anterior moiety a scapula is somewhat narrow and thick, being broader, with a thin, truncate blade behind, the whole bone having a cimeter-form, with sharp edges for its posterior third. Anteriorly it makes an extensive and close articulation with the coracoid, and is, on either side, in contact with the free posterior extremity of the clavicular arch or *os furculum*.

\* Gadow, Hans, Newton's "Dict. of Birds," p. 856. In the figures given here, the lettering is incorrect, in so far as the pectoral arch of *Bubo ignavus* is concerned, as Acd is made to indicate the scapula instead of the letters Sc.

A coracoid has a height of 4.5 cms.; a scapula a length of 6.2 cms., measured on the chord of its arc: the distance between the free extremities of the os furculum is 2.5 cms., measured within their arch, opposite the heads of the coracoids.

From the above description it will be seen that in its pectoral arch *Orthorhamphus* agrees with some of the typical Plovers and their near allies, as *Squatarola*, *Lobivanellus lobatus*, and others, wherein the scapulæ are long, those bones being much shorter, relatively, in the Lapwings.

The character of the pectoral arch in the *Laridæ* presents a number of points not found in the limicoline species mentioned, a prominent one being a "shoulder" on the outer aspect of either free end of the *os furculum*.

In *Chionarchus minor* a coracoid is almost the counterpart of that bone in *Rissa tridactyla*; the *os furculum* is thin and flat, and, although U-shaped, has a form peculiar to itself. The scapula has both pluvialine and larine characters in it.

*Pelvis and Coccygeal Vertebra* (fig. 8, Plate IV.; figs. 9 and 10, Plate V.)—Apart from such characters as it presents which are *sui generis* with respect to this species, the *pelvis* of *Orthorhamphus magnirostris* is distinctly in agreement with that bone as we find it in the skeletons of average Plovers and some of their allies. It is a different style of pelvis altogether from what we find in the *Laridæ*, in so far as I have examined the osteology of that family.

Anteriorly, the *ilia* are broad, much concaved and spreading, with their anterior margins rounded and finished off with a raised rim (fig. 9). Mesially they are, for a distance of about 2 cms., in close contact with the neural crest of the fused vertebræ of the anterior portion of the pelvic sacrum. Posterior to this contact, the *ilia* again diverge from each other at rather a smart angle, forming, as they do, the outer wall on either side to the posterior entrances to the "ilio-neural canals."\*

Viewed upon lateral aspect, it will be observed that the *cotyloid cavity* or *acetabulum* of this pelvis is relatively of small size, and that the foramen at its base measures but 4 mm. in diameter. There is a small *prepubic process* present, and the antitrochanter is small and faces almost directly forwards. Posteriorly, the "obturator foramen" is very open; indeed, this foramen and the large "obturator space" behind it form, in this pelvis, practically one vacuity (fig. 8). Above it, anteriorly, the *ischiodic foramen* is large and of a broad elliptical outline.

Beneath the obturator space, the *post-pubic element* is narrow, thin, and curved, until it comes in contact for about 5 millimeters with the infero-posterior angle of the ischium, after which it slightly broadens, curving mesiad to terminate in a deep, free point behind. Laterally, the *ischium* is broad and smooth; projects very considerably beyond the end of the consolidated

\* Owen, Sir Richard, "Comp. Anat. and Phys. of Verts.," vol. ii., p. 32.

sacral vertebræ or "sacrum," and exhibits a deep "ischiadie notch" on its posterior margin.\*

Viewed upon its dorsal surface, there is to be noted the parial intervertebral foramina, which, beginning small at the posterior apertures to the ilio-neural canals, continue so as to include the fifth pair, whereupon they become very considerably larger, being elliptical in outline, and maintain nearly a uniform size to the ultimate pair.

The sacrum is broadest at a point between the trochanters, and narrowest at its posterior termination, the margin joining these two points, on either side, being nearly a straight one. This line or sacral margin is likewise in close contact with the opposing border of the ilium, and it is very probable that in old individuals these two elements of the pelvis may anchylose along these borders; they appear to be nearly in that condition in the specimen at hand.

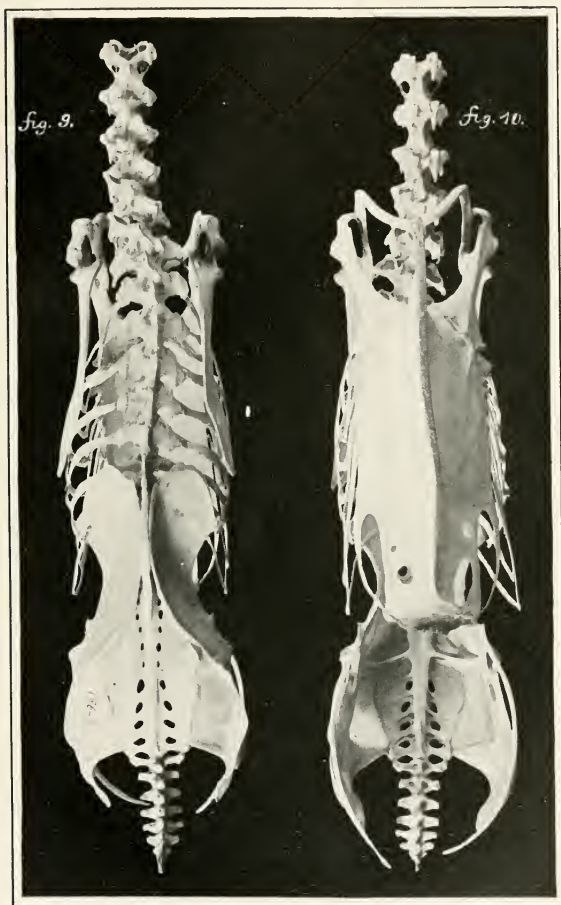
The post-acetabular part of either ilium, on this view of the pelvis, is convex throughout its extent for the anterior three-fourths of its area, while the hinder fourth is decidedly concave, which concavity is limited behind by the free margin of the ilium, and at the side by the conspicuously raised and sharp border of the same pelvic element. This latter border forms the *internal* edge of an ilium, as far back as a point opposite the cotyloid cavity, after which it forms the raised bounding crest standing between the post-acetabular area and the side of the pelvis.

On its ventral aspect we have to observe the capacious *pelvic basin* of this bone, and the not very strong pair of transverse processes of the eleventh sacral vertebræ, which are carried far out, transversely, as braces to points slightly posterior to the antitrochanters. Beyond this, the united centra of the sacral vertebræ exhibits, as usual, considerable enlargement in order to accommodate the increased size of the spinal cord in this part of its continuity. In the present instance, this enlargement is somewhat above the average for a bird of this size; it is hidden by the sternum in fig. 8 of Plate V.

The ventral surfaces of the ilia are flat and smooth throughout their entire extent, and the two pairs of sacral ribs, where they come in contact with these surfaces, completely anchylose therewith throughout the entire line of meeting. The fourth, fifth, and sixth sacral vertebræ have their transverse processes extended laterally as braces to the ventral surfaces of the ilia opposite them, and it is at this point that the pelvis of *Orthorhamphus* is narrowest transversely.

As already stated above, the skeleton of the tail in this bird consists of seven vertebræ and the *pygostyle*. This latter has a

\* Doctor Gadow, in describing "the Pelvic Arch" in the article "Skeleton" in Newton's "Dictionary of Birds," letters this notch *inc. isch.*; but nowhere states what those letters stand for. This likewise applies to the letters *Inc. isch. pub.* for the obturator space (obturator vacuity or obturator interspace of Owen) in the same work.





sharp anterior and a thickened posterior edge, the bone, as a whole, curving from base to apex. It is pierced by a small foramen at its postero-inferior angle, indicating the point between the hæmal spines of the otherwise indistinguishably fused eighth and ninth caudal vertebræ. Unfortunately, the apex of this pygostyle was broken off and lost when the skeleton was loaned me, but it would appear to have been quite pointed.

The neural spines of the first four caudal vertebræ are short and thick, while fairly well marked antero-posterior grooves at their apices make them appear as though each were moderately bifurcated.

The neural spines of the last three caudals become gradually more and more rudimentary as we proceed toward the pygostyle. These last three vertebræ, however, possess hæmal spines which are lacking in the four preceding them. No *chevron bones* appear to be present, and the diapophyses of all these caudal vertebræ, save the ultimate one, are well developed, they gradually becoming shorter and shorter as one follows them toward the coccyx.

*The Pectoral Limb* (figs. 12, 13, Plate VI.)—That this Stone-Plover is a good flyer is evidenced by the bones of the skeleton of its wings, and, although none of them enjoy pneumaticity—not even the humerus—they are nevertheless strong, and possess lengths in keeping with the balance of the skeleton. In the main, they are all rather slender and straight, the shaft of no one of them presenting any marked curvature, even the usual sigmoid curves of the shaft of the humerus being much less evident than in some birds representing other groups not intimately related to the *Limicolæ* or the *Longipennes*. By measurement I ascertain the lengths of these bones to be as follows\* :—

Humerus .. .. .	102 millimeters.
Radius .. .. .	113 ..
Ulna .. .. .	117 ..
Carpo-metacarpus .. .. .	50 ..
Proximal phalange of index digit .. .. .	22 ..
Distal one .. .. .	21 ..
Phalange of pollex without the claw .. .. .	14 ..

The caput humeri of the *humerus* is rather large and hemi-ellipsoidal in form. To its radial side there is an extensive, flat facet for the insertion of the pectoralis secundus muscle.† It stands at the proximal termination of the radial crest. This latter is an extensive process, bent palmar, its outline being

\* Should these measurements not agree with the figures in the Plate, it may be due to the fact that they were not followed by the half-toners in reproducing my photographs of the specimens. As submitted, the latter were slightly above natural size, in order to ensure sharpness in reproduction.

† Shufeldt, R. W., "Myology of the Raven," p. 72. A very full synonymy of this muscle is here presented, made by Dr. Hans Gadow (Bromm's *Klassen*, VI. Band, p. 246).

hemielliptical, with the free margin finished off with a thickened edge. (Length, 22 mm.; height, 7 mm.) In outline and other particulars this "radial crest" agrees with that part of the humerus in *Chionarchus minor* and *Hæmatopus niger*; while in *Squatarola* and *Belonopterus* it is relatively shorter and rather more pointed at the centre of its free margin, and decidedly more so in most *Laridæ*. In *Arenaria interpres* it is also pointed, with the point slightly bent palmad.

The "incisura capitis" is deep, and has a length equalling that of the head of the bone. To its ulnar side is to be noted the deep excavation, entirely surrounded proximally by a raised margin, known as the "pneumatic fossa," but here harbouring no foramina for that purpose. At its summit, proximad, there is a prominently developed tubercle—the tuberculum internum. On the palmar aspect of the head of this humerus the "incisura capitis" is deep and long, and the area immediately beyond it—the roof of the pneumatic fossa, as it were—is smooth and convex. As already stated, the subcylindrical shaft is but slightly curved, and, beyond its smoothness, lacking in any particular character.

At the distal extremity neither the enti- or the ecti-condylar process is especially prominent (fig. 13); while the latter in such birds as *Chionarchus minor*, many *Limicolæ* and *Longipennes*, is a very conspicuous character of the humerus.

The excavation for the insertion of the brachialis anticus muscle is rather deep, and the articular tubercles beyond it are prominently developed.

Upon comparing, character for character, as presented on the part of all the humeri at hand at this writing, I find that the humerus of *Orthorhamphus magnirostris* is much more like the humerus in *Hæmatopus niger* than it is like that bone in any other species; and when I say this, it must be remembered that I have not a humerus before me from a specimen of *Edicnemus*. Indeed, the skeleton of the limbs in the case of that genus lacks the femora, the humeri, the proximal ends of the tibio-tarsi and radii, and of one ulna.

Neither the *radius* nor the *ulna* in *Orthorhamphus magnirostris* present any peculiar characters. Either bone has the usual curvature of its shaft at the proximal third, so that, in the articulated limb, we find there a much larger "interosseous space" than exists between these bones for the remaining two-thirds, distad. Their shafts are smooth, and more or less cylindrical in form at the middle sections of their continuities. Ulna almost entirely lacks the papilliform elevations down its shaft for the quill-butts of the secondary feathers, which are more or less prominent in most *Laridæ*, some *Charadriidæ*, and the Oyster-catchers.

Possessing the usual ornithic characters, as they pertain to birds of the higher groups, the *radiale* and *ulnare* ossicles of the carpus are both present, well developed, and make the usual articulations with the bones of the antibrachium and manus.

The skeleton of the *manus* consists of the *carpo-metacarpus*, the phalanx of *pollex*, which latter supports a small *claw*, and the usual phalangeal joints of the *index* and *middle digits*. The radial or outer metacarpal bone of the carpo-metacarpus is elongate and tilted upwards. It is at the extremity of this co-ossified element of the hand that we find the osseous core of the spur in the Chilean Lapwing (*Belonopterus chilensis*) permanently attached by osseous fusion.

The proximal phalanx of the *index digit* and its expanded portion is not perforated as we see it in many Gulls, where it has two vacuities, one above the other, and each often of considerable size.

There is no claw on the distal phalange of the indicial digit, and this is the longest joint in the hand.

*Chionarchus* has the pollex metacarpal elongate, but it is at right angles to the long axis of the bone, while the Plovers and Oyster-catchers have it of medium size. *Edicnemus bistriatus* agrees in the matter of the characters of the skeleton of its pinion with *Orthorhamphus*, with the exception that I do not find any distal claw on the pollex phalanx.

The *Pelvic Limb* (fig. 11, Plate VI.)—In so far as its legs are concerned, *Orthorhamphus magnirostris* is a much shorter-limbed bird than *Edicnemus bistriatus*, as the following table will show:—

TABLE.  
(Lengths in millimeters.)

Species.	Femur.	Tibio-tarsus.	Tarso-metatarsus	Mid-an-terior toe.	Outer toe.	Inner toe.
<i>O. magnirostris</i>	65	118	87	44	44	35
<i>Æ. bistriatus</i> ..	?	135 (approx.)	123	44	38	29

The shaft of the *femur* is quite straight, smooth, and sub-cylindrical in form, and, as in the case of the pectoral limb, it is, with the remaining bones of the leg, non-pneumatic. *Caput femoris* is marked on top with a shallow, though extensive, pit for the *ligamentum teres*, the entire head of the bone being below the summit, which latter is smooth and convex from before, backwards. To the outer side of this surface there projects, slightly upwards, the *trochanter major*, while the major portion of that process extends directly forwards beyond the shaft of the bone (fig. 11). On the outer aspect of this trochanterian enlargement the surface is raised here and there for the insertion of muscles. Distally, the condylar extremity of the femur is massive, and seemingly out of proportion with the proximal end of the bone. The *rotular channel* between the condyles, anteriorly, is both deep and broad, while the latter exhibit definite beginnings

on the shaft. The popliteal depression on the posterior aspect distally is unusually deep and extensive, and it is bounded internally by a sharp and conspicuous crest, which extends up the shaft from the condyle. One finds the usual fibular cleft on the outer condyle, which is here deeply sculpt with prominent sides. Distally, the internal condyle supports a rather large, sub-triangular *flat* facet, which in life articulates with a perforated pad of cartilage resting on the summit of the tibio-tarsus. There is a distinct pit on the outer side of either femoral condyle, and these are for the insertion of the lateral ligaments.

At the knee-joint there is a small *patella*, which is broadly cordate in form, it being broad above where it is transversely concaved, with otherwise more or less sharpened borders.

From one end to the other, the *tibio-tarsus* is a perfectly straight bone, smooth, and of nearly cylindrical form. The non-extensive "fibular ridge," about a centimeter and a half long, commences at a point about a centimeter below the head. The summit, at right angles to the long axis of the bone, is marked with the usual elevations and depressions to accommodate the large femoral condyles. Above this surface rises the rather low cnemial crest, with both ecto- and ento-cnemial projections well developed. The first is the smaller of the two, and points directly outwards from the end of the bone, the second, thin and quadrilateral in outline, is directed anteriorly, being placed a little obliquely on the shaft, with its supero-external rounded angle outermost as well as innermost, with respect to its distance from the head of the bone. This latter projects beyond the shaft all around, until it arrives at the fibular articulation, where quite a valley occurs between its termination and the ecto-cnemial process.

Distally, the rather small condyles are both reniform in outline, with raised borders. Both anteriorly and posteriorly they terminate abruptly on the shaft, not feathering away upon it as in some birds. An "osseous tendinal bridge" is present anteriorly, spanning the tendinal groove. To the outer side of its proximal entrance there occurs a minute foramen.

*Orthorhamphus* possesses rather a small and slender *fibula*; it articulates with the outer side of the shaft of the tibio-tarsus in the usual manner. This is here very close with the entire length of the tibia, with which bone it fuses at its lower end, at a point rather below the middle of the shaft.

Coming to the *tarso-metatarsus* (Plate VI., fig. 11), it will be seen that the bone presents no curvature whatever, the entire shaft being perfectly straight between the two extremities. Anteriorly, it is conspicuously grooved longitudinally from one end to the other, the gutter being deepest down the proximal moiety, and becoming gradually more and more shallow down the distal half, till it deepens again between the middle and outer trochleæ, in which latter narrow groove we find the foramen for the anterior tibial artery. Both sides of the bone are flat, while posteriorly





there is only a narrow tendinal groove running down the proximal half of the shaft.

*Hypotarsus* is short and quadrilateral in form. It is composed of an outer and an inner portion, the latter being the longer of the two. They are joined superiorly by a transverse, osseous bridge, which is longitudinally pierced by a single tendinal foramen. This passes into the valley or groove which stands between the two crests of this hypotarsial projection distally.

The usual two foramina are found on the anterior aspect of the shaft, side by side, just above the small, low, elongate ridge upon which the tendon of the *tibialis anticus* muscle is inserted in life. These foramina pass directly through the shaft of the bone, one appearing upon either side of the hypotarsus posteriorly.

At the summit of this bone, the intercondylar tubercle is conspicuously developed, and the condylar depression upon either side of it is somewhat deeper than we usually find it in many birds.

Distally, the three trochlear processes are of large size, as compared with the shaft that supports them. The inner one is the most elevated, and projects next farthest posteriorly, as compared with the one for the outer toe, which slightly exceeds it in this respect, and is situated nearly as high on the shaft. The largest trochlear projection is the middle one, and it is at the same time the lowermost on the tarso-metatarsial shaft.

This bird possesses no *hallux*, and the *first metatarsal* is entirely absent, which is also the case in *Ædicnemus bistriatus*, in which species the tarso-metatarsus, being considerably longer than it is in *Orthorhamphus*, agrees with it otherwise very closely in the foregoing characters.

There is no especial agreement between this tarso-metatarsus of *Orthorhamphus* and the same bone in any of the *Laridæ* or in *Hæmatopus*, and still less in *Chionarchus*; while, upon the other hand, it holds many characters in common with the tarso-metatarsus of the Chilean Lapwing (*Belonopterus*), and in all likelihood with other *Charadriidæ*. In most of the limicoline forms, however, the *hypotarsus* is different; for, while short and of approximately the same form, it is generally twice grooved posteriorly instead of only once, as it is in *Orthorhamphus*.

Sesamoidal bones of various sizes according to their location occur at the plantar extremities—both distal and proximal—of the basal phalanges of pes, the largest and most important one being situated in the "sole of the foot" at the proximal end of the basal joint of the mid-anterior toe, where it covers entirely the plantar aspect of the mid-trochlear process of the tarso-metatarsus.

The *phalanges of pes* (Plate VI., fig. 11) are stouter, joint for joint, than the corresponding ones in the foot of *Ædicnemus bistriatus*, the arrangement being the same in both birds—that is, 3, 4, and 5 joints to the second, third, and fourth toes respectively, or the inner, middle, and outer ones.

As in the case of the bones of the thigh, leg, and tarsus, the skeleton of the foot in *Orthorhamphus* has more Plover in it than has that of any other bird thus far examined by me.

#### RELATIONSHIPS OF ORTHORHAMPHUS.

Nearly all ornithological writers and systematists place this genus of birds among the *Charadriiformes* and in the family *Charadriidæ*.

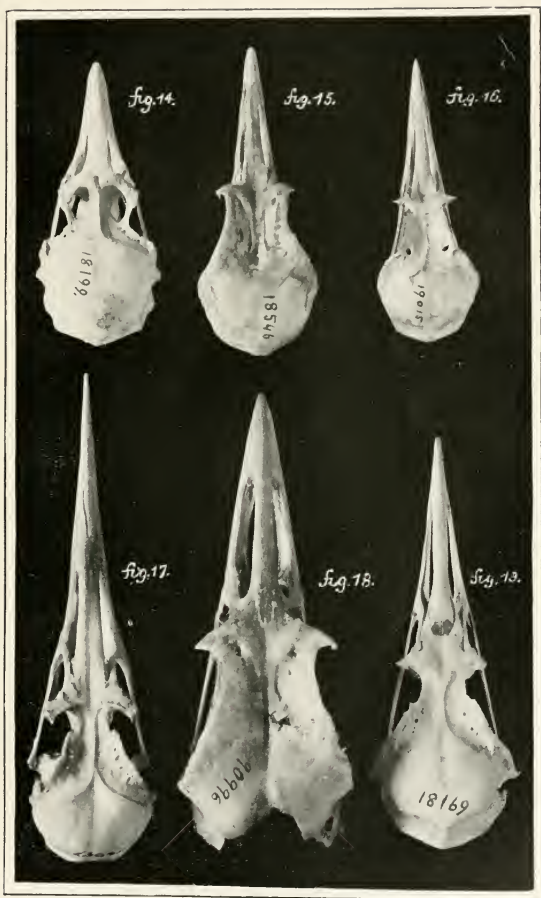
As already pointed out, Sharpe has the genus in his family (*Edicnemidæ*, the sole family representing the sub-order (VI.) *ÆDICNEMI*, which sub-order is followed next by a similar group (VII.) *OTIDES*, to contain the sole family *Otididæ*, or Bustards and their allies.

In characterizing his *Schizognathæ* as a sub-order of birds, and differentiating the *Charadriomorphæ* as a group of the same, he seems to have overlooked the fact that these "Stone-Plovers" (*Edicnemidæ*) are holorhinal and not schizorhinal birds (P.Z.S., 1867, pp. 456, 457).

In my own classification (*Amer. Nat.*, 1904, p. 851), the *CHARADRIIFORMES* are a super-sub-order (X.), in which a super-family, *Otidoidea* (II.) is created to contain the *Edicnemidæ* and *Otididæ*, and this is substantially my view of the relationships at the present time, though I have always entertained the opinion that there is by no means a narrow gap between the Stone-Plovers and the Bustards. The relationship here is not nearly as intimate as some ornithologists would have us believe. For example, Newton says in the "Dictionary of Birds" (article "Curlew," p. 130), in speaking of *Edicnemus (crepitans)*:—"This Curlew seems to have been an especial favourite with Gilbert White, in whose classical writings mention is often made. Its range extends to North Africa and India, though examples from the latter country have been regarded as requiring specific distinctions. Four other species of *Edicnemus* from Africa are recognized by Seebohm (*op. cit.*, p. 71. [That is, the Geogr. Distrib. *Charadriidæ*.])

"Australia possesses a very distinct species, *Æ. grallarius*, which some writers have raised to a genus, *Burhinus*, and there are three species in the Neo-tropical Region (*Æ. bistriatus*, *Æ. dominicensis*, and *Æ. superciliaris*). The analogy of all these birds to the *Otididæ* (Bustard) is manifest, but that they have any really close affinity to that family is questionable. An exaggerated form of *Edicnemus* is found in *Æsacus*, of which two species have been described—one, *Æ. recurvirostris*, from the Indian, and the other, *Æ. magnirostris*, from the northern parts of the Australian Region."

This opinion of Professor Alfred Newton's coincides with my own exactly; and, from what I know of the osteology of *Otis tarda*, I can fully endorse his view as to the questionableness of any near affinity between the *Edicnemidæ* and *Otididæ*. I only arrayed them in my classification, cited above, as I have for the





sake of present convenience—in other words, provisionally, until we know far more about the *entire morphology* of these birds than we do at the present time.

What has been brought out in the present paper finds its greatest interest in the added support it brings to what Huxley long ago pointed out—that is, the more or less near relationship of the great Plover-Snipe group of birds to the *Longipennes* and some of their congeners.

These (*Edicnemidæ*, in fact, in so far as their osteology goes, beautifully bridge across one of the gaps here, for we find both pluvialine and larine characters intimately blended all through the skeleton of *Orthorhamphus magnirostris*, and this is doubtless true of all the other typical "Stone-Plovers." Some of these osteological characters are typically those of a Plover, while others are equally so of a Gull. For example, were the skeleton of a fossil adult *Orthorhamphus magnirostris*, embedded in its matrix, handed to me, and I found only the posterior portion of the skull and mandible exposed, I would, upon viewing that, without the slightest hesitation, pronounce it as belonging to some typical representative of the genus *Larus*, and so on for other special regions of the skeleton of this group-linking species of bird.

#### EXPLANATION OF PLATES.

##### PLATE I. ( $\frac{3}{4}$ nat. size).

(All the figures in the Plates II.–VII. are reproductions of photographs made direct from the specimens by the author.)

Left lateral view of the head of an adult ♂ specimen of *Orthorhamphus magnirostris*. (No. 201,677, Coll. U.S. Nat. Mus.) By the author. Collected by Dr. Edgar A. Mearns, U.S. Army, on Loran Island, off South Ubian Island, P.I., 12th October, 1906. Shot by General Leonard Wood, U.S. Army.

##### PLATE II. ( $\frac{3}{4}$ nat. size).

Fig. 1.—Left lateral view of the cranium and mandible (disassociated) of *Orthorhamphus magnirostris*. Adult ♂ (No. 19,649, Coll. U.S. Nat. Mus.)

Fig. 2.—Left lateral view of the *hyoid arches* and the *superior larynx* and *trachea* (*in situ*). Same individual which furnished the skull for Fig. 1.

##### PLATE III. ( $\frac{3}{4}$ nat. size).

(All the figures in this Plate are of bones from the same skeleton as Plate I. (No. 19,649, Coll. U.S. Nat. Mus.))

Fig. 3.—Direct externo-lateral view of the circlet of *sclerotal plates* from the left eye

Fig. 4.—Left lateral view of the leading eight (8) cervical vertebræ of the spinal column; these are continuous with the vertebræ shown in Plate III., fig. 8, and Plate IV., figs. 9 and 10.

Fig. 5.—Direct inferior view of the cranium of *Orthorhamphus magnirostris*. Same skull as fig. 1, mandible removed.

Fig. 6.—The mandible belonging to the skull shown in figs. 1, 5, and 7 of Plates I. and II. Seen from above.

Fig. 7.—Direct superior view of the cranium of *Orthorhamphus magnirostris*. Same skull as in figs. 1 and 5; mandible removed. A shot-hole is seen at the anterior extremity of the maxillary process of the right nasal bone, and this mutilation likewise shows in fig. 5.

PLATE IV. (about  $\frac{5}{8}$  nat. size).

Fig. 8.—Right lateral view of the trunk skeleton of *Orthorhamphus magnirostris*. Same skeleton as before. The height of the coracoid in the specimen equals 46 millimeters (fig. 8). The superior apex of the pygostyle has been broken off.

PLATE V. (about  $\frac{5}{8}$  nat. size).

Fig. 9.—Direct dorsal view of the same trunk skeleton as shown in fig. 8, Plate IV. *Orthorhamphus magnirostris*. Length of sacrum in life equals 73 mm.

Fig. 10.—Direct ventral view of the same trunk skeleton as shown in figs. 8 and 9. *Orthorhamphus magnirostris*. Length of carina of sternum in life equals 78 mm. Note the irregularity of the xiphoidal foramina.

PLATE VI. ( $\frac{3}{4}$  nat. size).

Fig. 11.—Direct lateral view of the right pelvic limb of *Orthorhamphus magnirostris*. Same skeleton as before. The small patella is still attached to the dried ligament below. In this skeleton there is no first metatarsal nor hallux present.

Fig. 12.—Direct palmar aspect of the pectoral limb of *Orthorhamphus magnirostris*. Same skeleton as before (fig. 11, &c.) The phalanx of pollex bears a small claw.

Fig. 13.—Direct anconal aspect of left humerus from the skeleton of a specimen of *Orthorhamphus magnirostris*. Although this bone is marked No. 19,649, it does not belong to the same skeleton which furnished the figures for Plates I.—IV. (figs. 1—12). The left humerus that belongs with that skeleton was made imperfect by a shot-fracture, and its distal half lost. The present bone was put in to replace it (and marked 19,649!) The humerus in fig. 12 of this Plate has a length of 100 mm., while the one here figured has a length of 104 mm.

PLATE VII. ( $\frac{3}{4}$  nat. size).

Fig. 14.—Superior view of the skull of *Chionarchus minor*, mandible removed. (No. 18,199, Coll. U.S. Nat. Mus.)

Fig. 15.—Superior view of the skull of *Belonopterus chilensis*, with mandible articulated. (No. 18,546, Coll. U.S. Nat. Mus.)

Fig. 16.—Superior view of the skull of *Squatarola squatarola*, with mandible articulated. (No. 19,015, Coll. U.S. Nat. Mus.)

Fig. 17.—Superior view of the skull of *Hæmatopus niger*; mandible removed. (No. 13,636, Coll. U.S. Nat. Mus.)

Fig. 18.—Superior view of the skull of *Ædicnemus bistriatus*; mandible articulated. (No. 90,906, Coll. U.S. Nat. Mus.) This skull was apparently obtained from a discarded skin, as the entire occipital and basilar portions have been cut out and thrown away.

Fig. 19.—Superior view of the skull of *Rissa tridactyla*; mandible removed. (No. 18,160, Coll. U.S. Nat. Mus.)

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## New Records for South-Western Australia.

BY W. B. ALEXANDER, M.A., KEEPER OF BIOLOGY, WESTERN AUSTRALIAN MUSEUM, PERTH.

ON the retirement of Mr. B. H. Woodward, Director of the Western Australian Museum and Art Gallery, the collection of birds has come into my charge. In the course of re-arrangement and revision of names, which I have been undertaking during the last few weeks, I have discovered that there are specimens of several species in the collection which had not previously been recorded from south-west Australia. I have only carried the process of revision as far as the latest part of Mr. Gregory M. Mathews' "Birds of Australia" goes, but propose to continue as each part of that work appears.

### **Porzana fluminea** (Gould). Australian Spotted Crake.

The "Official Check-list" gives Queensland, New South Wales, Victoria, South Australia, and Tasmania as habitat. Mr. Mathews has separated the South Australian bird under the subspecific name of *whitei* (*Austral Avian Record*, vol. i., p. 73), characterized by being "much lighter grey on the under surface." The examples before me, a male and a young bird only partly fledged, were collected at Herdsman's Lake, near Perth, by Mr. Ostle, in January, 1901. The male appears to agree in every respect with the description given in Mathews' "Birds of Australia," vol. i., p. 212, but its breast is considerably darker grey than that of the specimen shown in the accompanying figure, which is a "male, collected near Adelaide, South Australia." I conclude, therefore, that the Western Australian bird agrees with *P. f. fluminea*, and not with *P. f. whitei*, as might have been anticipated. I have, however, no skins from the eastern States with which to compare it.

### **Diomedea chlororhynchus** (Gmelin). Yellow-nosed Albatross.

There is a specimen of this bird in the Museum which was obtained at Cottesloe Beach, near Fremantle, by Mrs. Campbell, in 1901. The species is not infrequent off the coast in winter, especially off Albany, and the Check-list mentions the seas of W. and N.W. Australia as included in the range of the bird. The following quotation from Mathews' "Birds of Australia," vol. ii., p. 282, suggests that no other specimen of this bird from Western

Australia has been preserved:—"Mr. Gilbert states that he saw it flying about Rottneſt Island, on the western coast. The latter observation would ſeem to apply to the bird at preſent called *Th. c. carteri*. Rothschild, and known by the unique ſpecimen only. Whether the adult of *Th. c. carteri* will differ from the adult of *Th. c. bassi* is at preſent unknown, but the probability is in the affirmative." The ſpecimen before me is an immature male in full adult plumage, and it agrees with the deſcription of *Thalassogeron chlororhynchus bassi* (Mathews), except that there are no patches of grey on the ſide of the breaſt. There is a ſlight ſtreak in front of the eye. The queſtion then ariſes whether this is the adult form of *Diomedea carteri* (Rothschild). That ſpecies was characterized chiefly by the bill being entirely black, but Mr. Mathews has ſhown, I think, that young birds may attain the adult plumage and continue to retain the immature colouration of the bill. Other points noted by Rothschild are that the face and ſides of the head are white, without the grey tinge of *T. chlororhynchus*, but it appears that *T. c. bassi* (Mathews) is ſimilar in this reſpect.

From my obſervations, I ſhould ſuppoſe that the black-billed bird is much commoner on the weſt coaſt in winter than the yellow-noled form. I had conſiderable opportunity for obſerving them when on the Federal trawler *Endeavour* in May and June, 1912, between Fremantle and Geraldton, and I never ſaw a yellow-noled ſpecimen. Whenever the trawl was brought to the ſurface the Mollymawks aſſembled and greedily devoured the ſmall fiſh which eſcaped from the net. It would be very intereſting to know whether a ſimilar preponderance of black-billed forms is met with in Eaſtern Australian waters. If not, it would point to the concluſion that *Diomedea carteri* is a diſtinct ſpecies. The bill in the preſent ſpecimen agrees preciſely with that of *T. c. bassi* in colouration, and the feet and legs are fleſh-coloured, with traces of blue-grey on the legs and toes. There is a ſecond ſpecimen in the collection which came to the Muſeum from the Perth Zoological Gardens, to which it was preſented by the captain of a ſhip. It agrees with the ſpecimen deſcribed in every feature, except that there are browniſh ſtreaks on the breaſt and that the yellow portion of the bill is decidedly greeniſh. It is alſo a young male, and it ſeems very probable that it alſo was obtained on the weſt coaſt.

#### **Heteroprion desolatus** (Gmelin). Australian Dove-Prion.

A female ſpecimen of this bird is in the collection. It was picked up on the North Beach, the neareſt point to Perth on the coaſt, in May, 1912, by Maſter Jack Brown. Under the name of *Prion banksi* (Gould), the range of this ſpecies is given in the "Check-liſt" as "Seas of S. Queensland, New South Wales, Victoria, S. and W. Australia, Tasmania." Mr. Mathews, in his "Birds of Australia," gives the range of *Heteroprion desolatus mattingleyi* as "Australian ſeas," but he remarks that "it appears almoſt

impossible to separate the synonymy of this bird from that of *Pseudopryon turtur*." In the "List of the Birds of Australia" he gives the range as "Victoria," evidently not feeling sure that records of this species from the other States are correct. Having carefully compared my specimen with the descriptions and diagrams in the "Birds of Australia," I have no hesitation in assigning it to *Heteropryon desolatus*, and I have little doubt that it belongs to the sub-species *mattingleyi*, as this is stated to have a narrower bill than any other sub-species, and the bill in my example agrees exactly with the figure of that of *mattingleyi* given in the "Birds of Australia."

**Rhyacophilus glareola** (Linn). Wood-Sandpiper.

There is a specimen of this species in the Museum which was shot by Mr. J. T. Tunney on 2nd February, 1900, at Kelmscott, which is situated on the Canning River, 16 miles south-east of Perth. In the "Birds of Australia" Mr. Mathews says:—"This bird was first added to the Australian list in 1896, when vol. xxiv. of the Catalogue of the Birds in the British Museum was published, from birds collected by the late Bowyer Bower in North-West Australia. Mr. Mattingley, in *The Emu* of ten years later, recorded it from Victoria. I now extend its Australian distribution, as I have birds collected in North-West Australia, Northern Territory, and Queensland." He does not mention that the British Museum Catalogue also records specimens collected by Sturt in South Australia. Though not an addition to the fauna of the State, this appears to be the first time that its occurrence in the south-west has been put on record. No doubt it belongs to the Eastern sub-species, *R. g. affinis*, Horsf., but I have no information at hand as to how this differs from the Western form.

**Dendrocygna javanica gouldi** (Gould). Whistling Duck.

There is a specimen of this Duck in the collection which was shot by Mr. Hutchinson at Wanneroo, 16 miles north of Perth, in 1899. Though the "Check-list" gives the range of the species *D. arcuata*, Gould, as "Australia generally," Mr. Mathews gives "North-West Australia, Northern Territory, Queensland, New South Wales, Victoria," both in the "List" and in the more recent part of the "Birds of Australia." It would seem, therefore, that its occurrence in south and south-west Australia had never been recorded, and I hereby supply the deficiency for the latter.

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**Birds and Caterpillars.**—Recently I saw a Black-faced Cuckoo-Shrike (*Graucalus melanops*) devouring caterpillars of the Emperor Gum Moth (*Antheraea eucalypti*). These caterpillars are very large, and are popularly supposed to be objectionable to birds.  
—T. H. TREGELLAS. Melbourne, 21/4/15.

## Rookeries of the White-breasted Cormorant (*Phalacrocorax gouldi*).

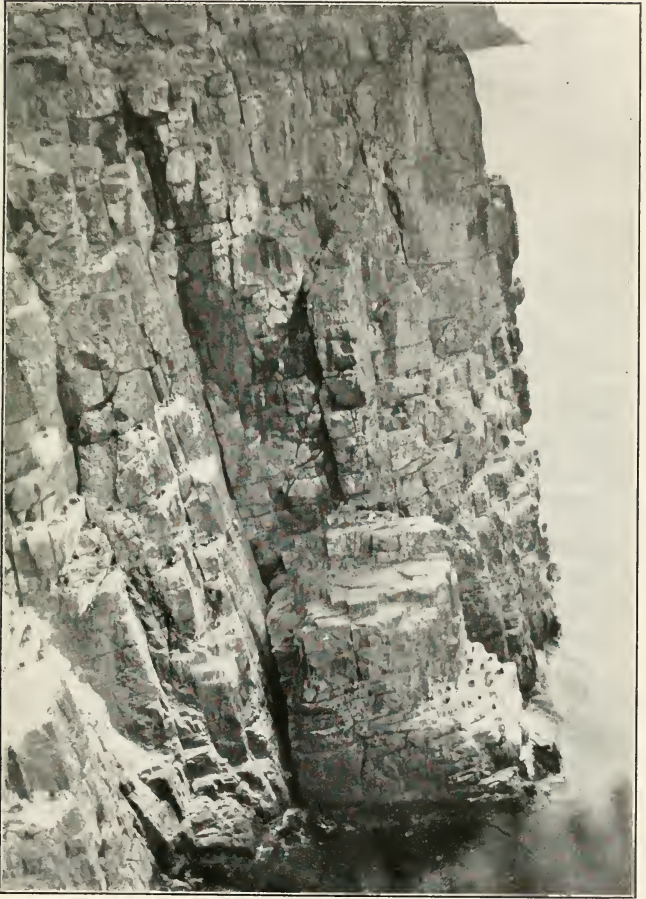
BY A. W. SWINDELLS, R.A.O.U., HOBART (TAS.)

THE White-breasted Cormorant (*Phalacrocorax gouldi*) is found throughout Tasmania, and is the least wary and the most numerous of the Cormorants. Perched on the piles and jetties along our tidal rivers, and approaching even to the wharves of the towns, these birds soon become familiar objects to the eye. Along the entire length of our rocky coast-line, and on every isolated rock and islet, they may be seen in numbers.

Probably nowhere around Tasmania, excepting on islands in Bass Strait, are there to be found such extensive rookeries of *P. gouldi* as exist at Cape Frederick Henry, North Bruni Island. From time immemorial the Cape has been the stronghold of these fine birds, great numbers annually congregating to breed on its rocky cliffs. Many years ago, in the very early days of Bruni Island settlement, the birds nested high above the cliffs on the steep slopes of the hill, among the hard grass and short herbage; then access to the rookeries was a very simple matter. As the island gradually became selected and visits of man more frequent, the birds each year chose their nesting-sites lower down the slopes until, finally, their permanent quarters were taken up on almost inaccessible portions of the cliffs.

Of several other rookeries of the White-breasted Cormorants, the most noteworthy are those on Breaksea Island, at the entrance to Port Davey, on the storm-beaten West Coast; on the cliffs near the lighthouse, South Bruni; and on the terminal rocks of a reef running out from Great Actæon Island, at the southern entrance to D'Entrecasteaux Channel. On the East Coast, on the dangerous and crumbling cliffs near Eaglehawk Neck, and on the White Rock, situate midway between Maria and Schouten Islands, similar nurseries flourish. At the last-named place the birds were found breeding in the autumn of 1907, young and eggs being taken early in May. Occasionally a few pairs of birds will seek to establish themselves on some isolated rock in one or other of our bays, or on some rocky portions of the shore; but, as they are persistently harassed by "pot-hunters" and folk residing near, such sites are soon abandoned, and only on secure headlands and little-frequented isles and rocks are their permanent homes to be found. At one time a small rookery existed on Blanche Rock, off Southport Island. The latest evidence, so far as can be gathered, of the birds breeding there is furnished by Col. Legge, who, in 1886, when on a visit to Actæon Island, saw that the birds were nesting, but was unable to land owing to the high seas running.

I visited Blanche Rock on the 15th November, 1907, but the only bird found nesting there was a Pacific Gull (*Gabianus pacificus*). Parts of Cormorants' old nests, thickly encrusted with guano, still remained in some of the hollows and crannies of the



Cormorant Rookery, Cape Frederick Henry, Tasmania.



rock, but it was evident that the spot had long since been deserted. From inquiries made it was ascertained that the birds had forsaken the locality because of frequent raids having been made upon them and extreme acts of barbarism perpetrated. Besides the rookeries mentioned, there are, no doubt, many others in existence of which little is known.

In November, 1907, in company with some members of the Tasmanian Field Naturalists' Club, I obtained my first introduction to the famous nesting haunt of the Cormorants on Cape Frederick Henry. With the aid of a rope down the cliffs a venturesome climber obtained a few specimens of eggs and young, but pressure of time and various reasons limited exploration to a very small area. It was, therefore, deemed advisable that a more complete investigation should be made at the earliest opportunity. Circumstances, however, did not permit of this being done until late in the following month. Great difficulty was experienced in getting a boat to run to the Cape, and the trip was nearly abandoned when I heard that the s.s. *Louie*, a fishing boat, was about to make a cruise for barracouta to Variety Bay, distant four miles from Frederick Henry. Arrangements were soon made, the captain agreeing to put us ashore as near to the Cape as the state of the sea rendered possible. Accordingly, on the morning of 22nd December my friend and I boarded the vessel, and after a comparatively smooth run of three hours we came in sight of the long, irregular line of cliffs. As the steamer drew near to the rookeries, which were rendered conspicuous by the well "whitewashed" walls of rock, our excitement became intense. Through field-glasses we could distinguish hundreds of Cormorants perched on the crags, while, in close proximity, hovered scores of Silver Gulls (*Larus novæ-hollandiæ*). The cliffs for some considerable distance presented such a scene of animation that it thrilled us with delight. Every shelf and ledge was alive with birds, while to and fro flew a continual stream busily engaged in attending to the needs of their young or brooding mates. Overhead the Gulls clamoured and wrangled as they greedily fought for the dainty morsels plundered from the Cormorants, or chased intending robbers.

The cliffs are indented with deep gulches, up which the waters swirl and dash with tremendous force. From either side of these inlets the rocks rise, rugged and perpendicular, to a height of from 150 to 200 feet. On the bold headlands flanking the gulches, and in the more sheltered situations, the Cormorants build their nests. Our skipper was hopeful of landing us direct on one of the rookeries. A promising spot being selected, the dinghy was lowered, and we were rowed across; but, owing to the precipitous nature of the rocks, and the heavy ocean swell rolling in at their base, and also taking into consideration the leaky condition of the dinghy, we were reluctantly compelled to abandon the attempt. Returning to the vessel, we steamed round the Cape to the head of a small bay, where, at noon, we were, to our intense relief, put ashore, the skipper arranging to call for us in the evening.

We gathered our ropes and cheerfully tramped over the hill to our destination. There was no difficulty in finding this, for the strong fœtid odour borne on the breeze easily guided us to the exact spot. We realized that the examination of the rookeries would occupy some time, and, before negotiating the steep declivities leading to the actual cliffs, we lunched. Then we sorted out the baggage and left behind everything that was not absolutely needful. The rookery first visited proved less difficult of access than first appearances indicated. On the steep slopes rising above the dizzy heights of the beetling cliffs grew, here and there, in the clefts of the rocks, stunted specimens of a species of boobyalla. To one of these a rope was securely fastened, and, after being knotted in loops at intervals to afford grips, was thrown over the cliffs, and the descent began. Some 20 feet below the summit we fortunately discovered a "chimney," narrow and tortuous, down which, clinging to the rope and steadying ourselves against each projecting piece of rock, we sped until its termination—a broad ledge running for some distance along the cliff's face—was reached. At one end of the ledge the cliffs rose sheer and unbroken from the sea—a clean drop by actual measurement of 95 feet. At the other end a succession of spurs and clefts led to the body of the rookery. This was lucky, for we had literally come to the end of our tether, the rope, 150 feet in length, which, we had judged, would enable us to reach the nests, giving out when we were within tantalizing distance of the goal.

The rookery was so situated as to enjoy the full warmth of the early morning sun and escape its dazzling noontide glare. Westerly winds could not affect it; only southerly "busters," which are rare, could have any disturbing effects. It was observed that few birds had chosen the opposite side of the narrow cliff-encircled inlet, upon which the afternoon sun shone pitilessly, the rays striking the white rocks and reflecting a quivering heat, which must have been intensely trying to the birds nesting there. All the nests in the rookery contained young birds in various stages, from the tiny nestling, naked and wrinkled, to the fat, fully-fledged creature that laboriously and awkwardly waddled out of reach at our approach, disgorging, in its eagerness to escape, quantities of half-digested food. The plumage of the young birds was of a sooty-brown colour on the breast and under parts dirty white. Newly-hatched birds were naked, skin black, and rather repulsive-looking objects.

We were anxious to capture some of the older fledgelings in order to examine them more closely, but our efforts were ineffectual, the birds being too wary. As we cautiously advanced along the rocks they shuffled farther and farther away, until, reaching the limit of the ledge, they tumbled over into the sea below, where, curiously enough, they appeared unable to support themselves. The majority lurched helplessly, head foremost, and, after some struggles, were drowned. A few birds instinctively dived and were not again seen, although a careful watch was

kept. Possibly they were caught in strong undercurrents and whirled round the promontory out of sight.

High up the cliffs, in a sheltered fissure of the bold mass of organ-pipe construction, and close to several Cormorants' nests, a pair of Silver Gulls had nested. The agitated cries and actions of the birds attracted our attention, and led to the discovery of the objects of their solicitude—two nearly fledged young. We wondered what had induced the Gulls to depart from the usual gregarious habits of the species.

Hours could profitably have been spent at this rookery, but we were anxious to explore others, and were compelled to hurry away. Regaining the summit of the cliff, we proceeded to a second rookery. Unlike their neighbours, who, from a safe vantage, had regarded with apathy our adventures amongst their young, the birds here viewed the invasion of their domain with evident consternation, and, although much alarmed, remained by their nests until actually driven away. The solicitude evinced for their helpless nestlings by the Cormorants won our admiration, and prompted us to leave them undisturbed. At the same time, we could not help reflecting that our forbearance would hardly gain the approval of fishermen. Erroneous ideas prevail regarding the supposed depredations of these birds on the fish, and the depletion of a stream or fishing bank is usually attributed to the rapacity of Cormorants; allowance is seldom made for the number of fishes taken by rod and net. Consequently, Cormorants are regarded as pests by the majority of people, and meet with merciless persecution. My sympathy is with the birds.

Searching along the cliffs, we found two more rookeries, but, as an inspection from above showed that the nests in each case were tenanted by young, no descent was made. Farther along we came to a deep gorge, with abrupt sides and straight walls of rock, from which water was slowly oozing. Our presence disturbed a Black-cheeked Falcon (*Falco melanogenys*), which rose excitedly, and soared in sweeping circles, uttering its shrill cry of alarm. Finally, it alighted on the dead branch of a starved old gum-tree growing on the edge of the precipice, and watched us. Far down in some sheltered niche it had its nest, but the place was too perilous to explore. Near the brink of the cliff a small colony of Silver Gulls was nesting among the scant, withered tufts of herbage. The nests were mere apologies of grass loosely placed in little hollows, and contained either two eggs or the full complement of three.

Our quest for Cormorants' eggs appeared likely to end in failure, as rookery after rookery was searched with the same disappointing result. Nor was this to be wondered at, considering the lateness of the season. At last, however, luck favoured us. In an angle of the cliff, far down on a craggy spur, we espied three nests on which the birds were brooding. A few stones thrown down frightened the birds off, and we rejoiced to see that the nests contained eggs. We determined to try to

reach them. It was agreed that one of us should remain at the summit of the cliff to manipulate the rope, while the other essayed the descent. So my friend decided to take charge of the rope while I went down. After a trying time I reached the nests, and, having collected eggs, I turned to make observations, and was enraptured at the spectacle revealed. Lower down the face of the cliff, and hidden from an observer above on account of the slightly overhanging nature of the rocks, was a rookery, between 40 and 50 nests, on a shelf a foot or two in width. The birds rose simultaneously, disclosing their eggs. With no thought of how the return trip was to be accomplished, the rope was lowered, and I gained the ledge. The greatest care was necessary when creeping along it, for the slightest error of judgment meant death in the deep waters surging far down at the base of the cliff. I crawled steadily along, and, selecting a few clutches of eggs, numbered them to avoid confusion, and placed them in my collecting box.

The majority of the nests contained two eggs, but a few held three, and several had only one egg. Much difference was apparent in the size of the eggs, some being small. A thin, even coating of lime protected the greenish-blue shell of some specimens; others were more thickly and roughly plastered. The clutches taken were nearly all fresh. Many nests in the rookery were being built; others were ready for eggs. The nests were fine, loose, comfortable structures, outwardly composed of kelp and long strips of pig-face weed (*Mesembryanthemum*) stripped of its leaves, the inner lining being of hard grass and soft coloured seaweeds. In one or two cases additional material had been used in the way of twigs and bark of eucalypts and portions of fern fronds, which the birds had evidently carried from the heights above. Measurements of a few nests chosen at random give the following results:—No. 1.—Depth, 5 inches; breadth, 20 inches; egg receptacle, 9 inches wide by 3 inches deep. No. 2.—Depth, 4 inches; breadth, 18 inches; egg receptacle, 6 inches wide by 2½ inches deep. No. 3.—Depth, 5 inches; breadth, 22 inches; egg receptacle, 10 inches wide by 3 inches deep.

The hoisting aloft of the collecting boxes proved a delicate task, but, by an ingenious handling of the ropes, the difficulty was overcome without the loss of a single specimen. The scaling of the ropes to the cliff's summit was a different matter, and only after a hard and trying climb, at the third attempt, was I able to reach the top again.

Evening was fast approaching as we gathered together our gear and treasures and bade a reluctant adieu to the home of, according to our reckoning, from 500 to 700 pairs of Cormorants. We found, upon our return to the steamer, that the fishermen had had a fairly successful day. Piled high in the stern were nearly 80 dozen barracouta. We were not sorry when, at about 11 p.m., Hobart was reached and we were trudging homewards, thoroughly tired, but happy.

## SUPPLEMENTARY NOTES.

Mr. Clive E. Lord, Sandy Bay, Hobart, one of whose photographs of the Cormorant rookery at Cape Frederick Henry illustrates this article, in a letter to a Tasmanian member of the Union, states:—"The visit (at which the photographs were taken) to the rookeries took place on 10th and 11th November, 1907. On the former day we were unable to reach the nests, owing to want of suitable tackle. We returned to our base camp that night, at Fond Bay, Bruni Island, and early next morning set out fully equipped. The party consisted of Messrs. E. A. Elliott, R. Plunkett, A. W. Swindells, and C. E. Lord, while Messrs. L. Rodway and Geoffrey Smith, author of 'A Naturalist in Tasmania,' accompanied the party to the edge of the cliff. The cliffs are about 500 to 600 feet in height, and for the first two-thirds of the descent the going was fairly easy. The slope, although steep, was covered with tussocks and mesembryanthemum. About 150 to 200 feet above water-level the slope ends and the cliffs drop almost sheer down, while on the rocky ledges, from a few feet above water-level, the nests are built on every available spot. After descending as far as we could go, we selected a suitable spot, and prepared the ropes and other appliances for the descent to the ledges, whereon hundreds of Cormorants could be discerned on their nests. One of our number, A. W. Swindells, descended to the ledges below, while the three remaining members adjusted the ropes, &c., to ensure his safety. After spending a profitable time at the rookeries, the whole party safely returned to the summit of the cliffs."

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**Lewin's "Birds of New South Wales."**

BY GREGORY M. MATHEWS, F.R.S. (ED.), F.L.S., F.Z.S., M.B.O.U.,  
R.A.O.U.

IN *The Emu*\* some notes on Lewin's "Birds of New Holland" (1808) were published. These created a little interest; friendly criticism from Mr. E. A. Petherick was offered, and has been accepted. I now agree that T. Bensley was the printer of the letterpress, as suggested by Mr. Petherick, and not the author, as I had contended. Bensley's address was "Bolt Court," not "Bold Court," as it was printed in that article.

I made the statement:—"The plates in this work were the first natural history subjects executed in Australia. In fact, only one set of engravings was done before—some views on copper (the copper being taken from a ship's bottom)." These misstatements were corrected by Mr. Petherick as follows:—"Lewin previously produced a work on the insects of New South Wales (London, 1805), containing 18 plates, dated 1803 and 1804. These were the earliest engravings executed in Australia. The set of engravings on copper from a ship's bottom (by Preston) were

\* *Emu*, vol. xii., pp. 49-51.

first published in 1814." I have now acquired a copy of a book entitled "Birds of New South Wales, with their Natural History," by John William Lewin, A.L.S. (Sydney). Printed by G. Howe, 1813. We have here another book of great historical interest, and I give my rendering of the facts, and again invite criticism.

*This is probably the first book devoted to natural history printed and PUBLISHED in Australia.* Shaw's "Zoology" (1794) and Lewin's (1808) were, of course, printed and published in London, as, also, was apparently Lewin's "Insects" (1805). This Australian book differs a little from the London (1808) one. The order of the plates is not exactly the same, and the letterpress is very scanty, no scientific names being given. There are eighteen plates, and at the foot of each has probably been printed: "Published as the Act directs" (different dates in December, 1804, to February, 1905) "by J. W. Lewin, New South Wales." This appears on Plate I. in my copy, but it is missing from all the rest, through the binder having cut down the plates very severely. There is, however, a copy in the British Museum (Natural History), and it has not been so badly handled, seven dates being preserved, thus:—

Pl. 1—16th Dec., 1804.

Pl. 11—30th Jan., 1805.

Pl. 3—31st Dec., 1804.

Pl. 12—29th Jan., 1805.

Pl. 4—11th Jan., 1805.

Pl. 15—2nd Feb., 1805.

Pl. 10—15th Feb., 1805.

Consequently, I conclude that, after Lewin had completed his "Insects," he went on to the "Birds." These were engraved and proved and SETS STRUCK OFF in Sydney, and then the plates despatched to England, and the book published under the supervision of Lewin's brother, with amended letterpress. Then, in 1813, Lewin had the Australian sets published in Sydney, the letterpress being printed by G. Howe. The water-mark of the press is "ANSELL 1809," in some cases "C. ANSELL 1809," while the water-mark of the plates is "1802," save in the case of Plate XVIII., where it is 1811. Now, this Plate XVIII. is of the Mountain Bee-eater, and it is quite different from the figure given in the 1808 edition, Plate VII. *Pipra gularis* is not included in the 1813 book, but, instead, is a plate of the Crested Shrike, which is not in the 1808 issue. Both plates appear in the 1822 issue. The fourteenth plate in the 1813 book gives a figure of the Warty Face Honey Sucker. This is the same plate that is included in the 1808 issue, No. III., but on the latter are engraved additional figures of the head and tongue. Consequently, these must have been added after the Australian sets were struck off, but whether by Lewin himself or by someone else I cannot say—most probably in London. I saw a copy with no title-page in the Sydney Public Library, but I know of no others. Any further information regarding this book will be esteemed and all kindly criticism welcomed. The copy in the Natural History Museum, South Kensington, is not all original, the last plate having been added later.

## Descriptions of Nests and Eggs New to Science.

BY H. L. WHITE, R.A.O.U., BELLTREES, N.S.W.

**Micrœca brunneicauda**, Campbell. Brown-tailed Flycatcher.

*Nest*.—Small, open structure, composed of bark, the outside being covered with small pieces of leaves and cobwebs, and gives the following measurements:—Outside—breadth  $1\frac{3}{5}$  inches, depth  $1\frac{1}{10}$  inches; inside—breadth  $1\frac{3}{10}$  inches, depth  $\frac{3}{5}$  inch.

*Eggs*.—One egg only, oval in shape; surface of shell fine, smooth, and slightly glossy, and under the lens minute pittings can be noticed, and these are well distributed. Ground colour pale bluish-grey, spotted all over, but particularly at the larger end, where an irregular zone is formed, with chestnut and purple, those of the latter colour mostly appearing as if beneath the surface of the shell.

Measurement in inches:—.77 x .54.

*Locality*.—Taken for me by Mr. G. F. Hill at Napier Broome Bay, North-West Australia, on 23rd October, 1909.\*

Many of the more recently created sub-species of birds show such slight variation that one requires a strong glass, and an imagination, to detect the differences; others, again, from widely-separated localities, are easily distinguished, while the eggs also differ considerably. I consider that the following come under the second category:—

**Acanthiza uropygialis condora**, Mathews. Chestnut-rumped Tit-Warbler.

*Nest*.—Composed of bark, grass, and cobwebs, lined with wallaby fur and feathers, and placed in a stump 6 inches from the ground.

*Eggs*.—Clutch of three, pointed oval in shape, surface of shell very fine and slightly glossy; ground colour white, scattered over the surface, but particularly at the larger end (especially so with specimen *c*), with fine markings of pale reddish-brown and a few of dull purplish-grey.

Measurements in inches:—(*a*) .62 x .44, (*b*) .63 x .45, (*c*) .60 x .45.

*Locality*.—Taken by Capt. S. A. White at Moorilyanna Water Well, Central Australia, on 29th July, 1914.

**Cinlosoma castanonotum dundasi**, Mathews. Chestnut-backed Ground-Bird.

*Eggs*.—Clutch of two, rather swollen oval in shape; surface of shell fine, smooth, and slightly glossy; ground colour pale greyish-white, finely spotted all over, but particularly at the larger end, where a cap is formed, with umber and dull slate, the latter appearing as if beneath the surface of the shell. Specimen *a* is much more heavily marked than specimen *b*.

Measurements in inches:—(*a*) 1.17 x .85, (*b*) 1.11 x .83.

*Locality*.—Taken by Capt. S. A. White at the Officer River, near the Everard Ranges, Central Australia, on 6th August, 1914.

\* *Vide Emu*, vol. x., pp. 169 and 273.

**Mytisa (Amytornis) striata oweni.** Mathews. Striated Grass-Wren.

*Nest.*—Is of the domed type and globular in shape, outwardly constructed of dried spinifex (*Triodia*) stems, and fine grasses. The interior very neatly lined with buff-coloured vegetable down, but the cavity containing the eggs is small in comparison with the bulk of the nest. It was difficult to tell the top from the bottom of the nest when it was removed from the growth of spinifex.

*Eggs.*—Clutch of three, oval in shape, surface of shell fine, smooth, and slightly glossy; ground colour white, with the very faintest tinge of pinkish-buff, finely spotted and speckled all over, but particularly at the larger end, where a well-marked zone is formed, with pale reddish-brown, umber, and dull slate, the latter appearing as if beneath the surface of the shell. The markings are so small that it is necessary to use a magnifying-glass in order to determine the correct colours.

Measurements in inches:—(a) .79 x .59, (b) .77 x .57, (c) .80 x .58.

*Locality.*—Taken for me by Mr. F. Lawson Whitlock at Spinifex Plain, Borewell, East Murchison, Western Australia, on 12th September, 1909.

**Aphelocephala castaneiventris whitei.** Mathews. Chestnut-bellied Whiteface.

*Nest.*—Composed of grass and twigs, lined with animal fur, and placed in a hollow mulga.

*Eggs.*—Clutch of three, swollen oval in shape; surface of shell fine, smooth, and glossy; ground colour pale buffy-white, well spotted all over, but particularly at the larger end, where a well-defined zone is formed, with light and dark umber markings, intermingled with those of dull purplish-grey, the latter appearing as if beneath the surface of the shell.

Measurements in inches:—(a) .67 x .5, (b) .67 x .5, (c) .65 x .51.

*Locality.*—Taken by Capt. S. A. White at the Everard Ranges, Central Australia, on 8th August, 1914.

## Descriptions of Nests and Eggs of *Monarcha canescens* and *Neochmia phaeton albiventer*.

By DR. W. MACGILLIVRAY, VICE-PRESIDENT R.A.O.U., BROKEN HILL.

*Monarcha canescens* (Salvadori), *Monarcha melanopsis canescens* of Mathews' 1913 "List of the Birds of Australia," is a rare bird at Cape York, but quite common in the scrubs and open forest country at the back of Lloyd's Bay. It nests in the scrubs, where Mr. W. McLennan was fortunate in finding the first nest on the 11th January, 1915. The nest was about 20 feet from the ground in a fig-tree growing in scrub on the Claudie River.

The eggs are three in number, blunt ovals in shape, shell smooth with slight lustre, creamy white in colour, dotted all over with small reddish-brown irregularly-shaped spots, with a few underlying pale purplish ones. The spots are sparingly distributed towards the small end, but form a distinct zone at the larger. The eggs measure in millimetres :—(a) axis 23 x diameter 17, (b) axis 23 x diameter 16, (c) axis 24 x diameter 18.

The nest is a beautiful, compactly built, goblet-shaped structure, placed in an upright fork of a small scrub tree. It is composed of fine strips and flakes of paper bark, bound together by cobwebs. In one nest examined many flocculent masses of cobweb adhered to the exterior; another was only sparingly bound round with cobweb. The lining is of vegetable hair. External diameter at brim, 70 mm.; from brim to bottom, 120 mm.; internal depth, 50 mm.

***Neochmia phaeton albiventer*** (Mathews, *South Australian Ornithologist*, April, 1914).

The eggs of this bird, four in number, were taken by Mr. W. McLennan at the Archer Creek, on the western side of the Cape York Peninsula, on 21st April, 1915. They are pure white, oval in shape, with a slightly glossy shell. Measurements :—(1) 15 mm. x 12 mm., (2) 15 mm. x 12 mm., (3) 14.5 mm. x 11.5 mm., (4) 14 mm. x 11 mm.

The nest is a spherical structure, composed of the stems, blades, and seeding heads of some coarse grass, with a little fur of some animal, the internal lining consisting of a few feathers, some fur, and a portion of the cast skin of a snake. The external diameter is 140 mm.

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## Observations around Anglesea, Victoria.

BY HERBERT A. PURNELL, R.A.O.U.

IN company with Mr. Frank Howe, C.M.Z.S., of the Bird Observers' Club, early on the morning of 2nd April, 1915, I started for a favourite hunting-ground around Anglesea. During our trip 76 different species of birds were actually observed. This, I think, is a good record for so short a trip, and especially in an "off" season. On previous occasions, and in the nesting season, I have never recorded many more than 60 birds in a week-end outing.

Geelong district, as stated by Mr. C. F. Belcher, in "The Birds of the District of Geelong," has about 244 species, so resident naturalists have one of the best fields for ornithological observations. The Connemara Lakes, ocean beaches, open plains, lightly-timbered country, and Otway forests form the home of many forms of bird life.

Our drive through the open country around Waurn Ponds revealed nothing beyond the usual forms noted on any country

road, such as Chats, Ground-Larks, Tits, Magpies, and so forth. Our first halt was at Jan Juc, where we wandered through the eucalypts in a paddock which in the nesting season always contains nests of the Australian Goshawk, *Astur approximans* (*Urospiza fasciata fasciata*), Rufous-breasted Whistler, *Pachycephala rufiventris* (*Lewinornis rufiventris rufiventris*), Brown Tit-Warbler, *Acanthiza pusilla* (*A. p. macularia*), Striated Tit-Warbler, *Acanthiza lineata* (*A. l. chandleri*), Buff-tailed Tit-Warbler, *Acanthiza reguloides* (*Geobasileus reguloides connectens*), Yellow-tailed Tit-Warbler, *Acanthiza chrysorrhoa* (*Geobasileus chrysorrhous sandlandi*), Wood-Swallow, *Artamus sordidus* (*Pseudartamus cyanopterus*), Speckled Warbler, *Chthonicola sagittata* (*C. s. inexpectata*), Owllet Nightjar, *Egotheles nova-hollandiæ* (*Æ. cristata cristata*), Tawny Frogmouth, *Podargus strigoides* (*P. s. victoriæ*), White-shouldered Caterpillar-eater, *Campephaga humeralis* (*Lalage tricolor tricolor*), and of many other interesting birds, including several species of Honey-eaters. Last season I was surprised to find that a nest of the Australian Goshawk had been occupied for the third season in succession. This area, where the gum-trees grow, is only a few acres in extent, but is always thronged with birds.

Starting again, we made our way slowly through the forest, and arrived at Anglesea. The next three days were spent among the ranges around Anglesea. The Chestnut-rumped Ground-Wren, *Hylacola pyrrhopygia* (*H. pyrrhopygia belcheri*), Emu-Wren, *Stipiturus malachurus* (*S. m. tregellasi*), White-browed Scrub-Wren, *Sericornis frontalis* (*S. longirostris harterti*), Rufous Bristle-Bird, *Sphenura broadbenti* (*Maccoyornis broadbenti broadbenti*), and the Singing Honey-eater, *Ptilotis sonora* (*Meliphaga sonora sonora*) were our chief objects for observations. We were fortunate in seeing many of these birds. The Ground-Wren was seen nearer Anglesea than we had expected, and we are of the opinion that it should be found anywhere among the short ferny stretches that are so characteristic of the coastal country. Emu-Wrens, both males and females, were seen in dozens. Both sexes were in full plumage, the blue throat of the male being very pronounced. The call of these birds resembles that of the Blue Wren-Warbler, *Malurus cyaneus* (*M. c. henriettæ*), but is much fainter. Emu-Wrens are very numerous in the heathy scrubs and the low tea-tree, where I located them in September, 1913. During the nesting season they keep more to the low-lying bushes of heath, and it is very hard to locate a nest unless one flushes the bird. On one occasion I found a nest containing an egg of the Narrow-billed Bronze-Cuckoo, *Chalcococcyx basalus* (*Neochalcites basalus mellori*). This nest, which was within a few yards of the shore, was constructed entirely of seaweed, and lined with a few feathers. The Cape Otway Scrub-Wren (*Sericornis longirostris harterti*) abounds all along our coast-line; I have noted it from Ocean Grove and Barwon Heads right through to Lorne. This bird is also present in great numbers in the samphire around the salt pans that front Corio Bay.

My old friend the Rufous Bristle-Bird, *Sphenura broadbenti*



Rufous Bristle-Bird at Nest.



(*Maccovornis b. broadbenti*)—I call it friend because I meet with it on every trip to the coast—was seen running from clump to clump, as usual; but the Bristle-Birds never give one much chance of observing their habits, for they keep to the thick undergrowth. I have studied these birds for several seasons, and know every haunt from Geelong to Lorne. If photographs are desired, I generally know where to get a nest without losing any time searching. Last season, Mr. Charles Barrett, who was on a trip with Mr. A. C. Stone and myself, was able to secure a good photograph of the bird at the nest. The Bristle-Bird was always supposed to be very shy during nesting time, but Mr. Barrett found little difficulty in convincing one that no danger was near. I am of opinion that the Bristle-Bird uses its nest for two seasons in succession, for I have found, on pulling a nest to pieces, an egg, generally addled, among the dry lining of the nest. An egg found in this position is often bleached as if it had suffered a winter's rain and soaking. Very few old nests are found during a nesting season. The nests, being concealed in such secluded spots, are not likely to be blown away, as is the case with birds' nests built in trees; also, the bird's isolated haunts are not likely to be visited often by boys. When I see a female Blackbird dodging about my garden it reminds me very much of the Bristle-Bird.

The Singing Honey-eater is to be found all along our coast-line, from Bream Creek to Lorne. In the course of one season I found a nest at Torquay; it was situated about 7 feet from the ground, and the eggs were easily discerned from beneath, so frail was the nest. Around Anglesea this Honey-eater is to be seen in great numbers; it frequents the low gum-trees.

Appended is a list of the birds observed during my trip with Mr. Howe:—

**Eudyptula minor** (*Eudyptula minor undina*). Little Penguin.—Seen on the beach at Point Roadknight.

**Turnix varia** (*Ortygodes varius varius*). Painted Quail.—A pair observed on the forest road near Anglesea.

**Phaps chalcoptera** (*Phaps chalcoptera chalcoptera*). Bronze-winged Pigeon.—Several birds seen in the forest.

**Larus novæ-hollandiæ** (*Bruchigavia novæhollandiæ novæhollandiæ*). Silver Gull.—A number of birds on the beach.

**Notophox novæ-hollandiæ** (*Notophox novæhollandiæ*). White-fronted Heron.—Flying around the headland at Point Roadknight.

**Chenopsis atrata** (*Chenopsis atrata atrata*). Black Swan.—Several birds flying overhead at dusk.

**Phalacrocorax carbo** (*Phalacrocorax carbo novæhollandiæ*). Black Cormorant.—A few birds on the Anglesea River.

**Phalacrocorax gouldi** (*Hypoleucus fuscescens*). White-breasted Cormorant.—These birds were on the Barwon River, near Geelong.

**Sula australis** (*Morus serrator dyotti*). Australian Gannet.—Flying along the coast-line.

**Uroaëtus audax** (*Uroaëtus audax audax*). Wedge-tailed Eagle.—These birds are always to be seen near Point Addis.

**Glossopsitta concinna** (*Glossopsitta concinna*). Musk-Lorikeet.—A great number of these birds in the eucalypts.

**Glossopsitta porphyrocephala** (*Glossopsitta porphyrocephala porphyrocephala*). Purple-crowned Lorikeet.—Also in flocks around the Anglesea forest.

**Calyptorhynchus funereus** (*Calyptorhynchus funereus funereus*). Black Cockatoo.—A colony of eight birds in the trees in front of Anglesea Hotel.

**Callocephalon galeatum** (*Callocephalon galeatum*). Gang-Gang Cockatoo.—These birds in full plumage in the forest country.

**Platyercus eximius** (*Platyercus eximius eximius*). Rosella.—Appears all through the forest.

**Platyercus pennanti** (*Platyercus elegans elegans*). Crimson Parrot.—Always to be seen in the timber near Bull's Well.

**Lathamus discolor** (*Lathamus discolor tregellasi*). Swift Parrot.—Also in the eucalypts on the track to Roadknight.

**Psephotus hæmatonotus** (*Psephotus hæmatonotus*). Red-backed Parrot.—Rose from the ground near Freshwater Creek bridge.

**Dacelo gigas** (*Dacelo g. gigas*). Great Brown Kingfisher.—Keeps more to the open country.

**Hirundo neoxena** (*Hirundo neoxena neoxena*). Welcome Swallow.—Seen all through the trip.

**Micræca fascians** (*Micræca fascians fascians*). Brown Flycatcher.—Always to be seen near Jan Juc Creek.

**Petroica leggii** (*Petroica multicolor frontalis*). Scarlet-breasted Robin.—Keeps more to the burnt forest country.

**Petroica phænicea** (*Littlera chrysoptera phænicea*). Flame-breasted Robin.—Also noted in the burnt forests.

**Erythrodryas rhodinogaster** (*Erythrodryas rodinogaster inexpectata*). Pink-breasted Robin.—Both male and female birds along the Anglesea River.

**Melanodryas bicolor** (*Melanodryas cucullata vigorsii*). Hooded Robin.—Only one bird seen when going through the forest.

**Pachycephala gutturalis** (*Pachycephala pectoralis youngi*). Yellow-breasted Whistler.—Several birds seen near Scrubby Creek.

**Pachycephala rufiventris** (*Lewinornis rufiventris rufiventris*). Rufous-breasted Whistler.—Several birds in the gums near Jan Juc.

**Pachycephala ollivacea** (*Timixos olivaceus tregellasi*). Olive Whistler.—Pleased to see this bird again at Scrubby Creek.

**Eopsaltria australis** (*Eopsaltria australis viridior*). Yellow-breasted Shrike-Robin.—All along the Anglesea River and side creeks.

**Rhipidura albiscapa** (*Rhipidura flabellifera victoriæ*). White-shafted Fantail.—Always seen right through the forests.

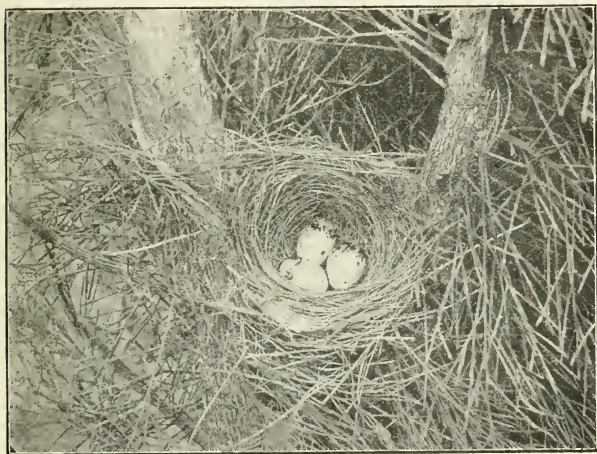
**Rhipidura motacilloides** (*Leucocirca tricolor tricolor*). Black-and-White Fantail.—Keeps more to the open country.

**Seisura inquletta** (*Seisura inquieta inquieta*). Restless Flycatcher.—Again observed in the gum paddock at Jan Juc.

**Graucalus melanops** (*Coracina novæhollandiæ melanops*). Black-faced Cuckoo-Shrike.—Several birds seen while driving through the forest.

**Cinclosoma punctatum** (*Cinclosoma punctatum neglectum*). Spotted Ground-Bird.—A few birds seen the other side of Scrubby Creek

**Hylacola pyrrhopygia** (*Hylacola pyrrhopygia belcheri*). Chestnut-rumped Ground-Wren.—There is no doubt that Mr. G. M. Mathews is justified in separating this bird from the New South Wales form. We found it on the heathy hills behind Anglesea, in the dry and scrubby creeks, and also in the burnt country near Point Road-knight. Its actions are very rapid, and when travelling across the open and burnt scrub its motion is a combination of running and flying, the tail being held perpendicularly. The song is not unlike



Nest and Eggs of Yellow-breasted Whistler.

FROM A PHOTO. BY H. A. PURNELL.

that of a *Calamanthus*, but in a higher key, and not so sustained. As soon as a bird was secured, it was noticed that it was much smaller than any other members of the genus that we had handled. The striping on the throat and breast was much darker, the abdomen much whiter, the back darker, and the rump much less rufous than in *Hylacola pyrrhopygia pyrrhopygia*. The head and nape of the latter are of a dark olive shade, but in *Hylacola p. belcheri* these parts assume a greyish hue. The flanks of *Hylacola p. pyrrhopygia* are of a dingy grey colour, and the bill and feet are rufous. The flanks of *Hylacola p. belcheri* are rufous-grey, and the bill and feet are almost black; otherwise, the markings of both birds are identical, but always more conspicuous in *Hylacola p. pyrrhopygia*.

**Calamanthus albiloris** (*Calamanthus fuliginosus albiloris*). White-colored Field-Wren.—In fairly large numbers on the roads near Jan Juc.

**Epthianura albifrons** (*Epthianura albifrons albifrons*). White-fronted Bush-Chat.—Always in great numbers along the roads.

**Acanthiza pusilla** (*Acanthiza pusilla macularia*). Brown Tit-Warbler.—Many birds to be seen.



Yellow-breasted Shrike-Robin.

FROM A PHOTO BY H. A. PURNELL.

**Acanthiza lineata** (*Acanthiza lineata chandleri*). Striated Tit-Warbler.—Several birds in the saplings around Bull's Well.

**Acanthiza reguloides** (*Geobasileus reguloides connectens*). Buff-tailed Tit-Warbler.—Birds seen all through the trip.

**Acanthiza chrysorrhous** (*Geobasileus chrysorrhous sandlandi*). Yellow-tailed Tit-Warbler.—Very numerous in the acacia hedges.

**Sericornis frontalis** (*Sericornis longirostris harterti*). White-browed Scrub-Wren.—There appear to be very slender reasons why this

form should be separated from *Sericornis l. longirostris*, of South Gippsland. The white eyebrow of *Sericornis l. harterti* is certainly more conspicuous, and on the breast and abdomen this form has a beautiful shading of buff, which is only slightly discernible in the Gippsland form. The rufous colour on the back and lower rump of *Sericornis l. longirostris* is almost missing in the Cape Otway form. The bill of *Sericornis l. longirostris* is much stouter and slightly shorter than that of *Sericornis l. harterti*, and in the latter it is slightly curved or hooked.

**Malurus cyaneus** (*Malurus cyaneus henriettae*). Blue Wren-Warbler.—All male birds seen were in full plumage.

**Stipiturus malachurus** (*Stipiturus malachurus tregellasi*). Emu-Wren.—Dozens of birds seen in the heathy country at the back of Scrubby Creek.

**Sphenura broadbenti** (*Maccoyornis broadbenti broadbenti*). Rufous Bristle-Bird.—I have seen this bird on every trip to the landslips along the Anglesea coast.

**Artamus sordidus** (*Pseudartamus cyanopterus*). Wood-Swallow.—Several dozens massing together on a dead limb.

**Colluricincla harmonica** (*Colluricincla harmonica victoriae*). Grey Shrike-Thrush.—This bird was seen all through the forest.

**Grallina picata** (*Grallina cyanoleuca cyanoleuca*). Pied Grallina.—Several birds seen at Freshwater Creek.

**Gymnorhina leuconota** (*Gymnorhina hypoleuca leuconota*). White-backed Magpie.—Keeps more to the open country.

**Cracticus destructor** (*Bulestes torquatus olindus*). Collared Butcher-Bird.—Always to be found in the sheoaks at Freshwater Creek.

**Falcunculus frontatus** (*Falcunculus frontatus flavigulus*). Yellow-bellied Shrike-Tit.—Seen and heard calling in the saplings near Anglesea River; very rare bird in our district.

**Neositta chrysoptera** (*Neositta chrysoptera luthami*). Orange-winged Tree-runner.—Single bird seen near the Big Hill on road to Anglesea.

**Climacteris leucophæa** (*Climacteris leucophæa leucophæa*). White-throated Tree-creeper.—Very plentiful through the forest and around Anglesea.

**Zosterops dorsalis** (*Zosterops lateralis westernensis*). White-eye.—Birds very plentiful.

**Dicæum hirundinaceum** (*Austrodicæum hirundinaceum hirundinaceum*). Mistletoe-Bird.—Birds seen, but travelling fast through forest.

**Pardalotus punctatus** (*Pardalotus punctatus interjectus*). Spotted Pardalote.—Both male and female seen at Anglesea and Jan Juc.

**Melithreptus lunulatus** (*Melithreptus lunatus lunatus*). White-naped Honey-eater.—Seen along the Anglesea.

**Melithreptus brevisrostris** (*Melithreptus atricapillus submagirostris*). Brown-headed Honey-eater.—Birds flying about in large flocks and alighting in tops of eucalypts.

**Acanthorhynchus tenuirostris** (*Acanthorhynchus tenuirostris victoriae*). Spinebill.—Several birds observed.

**Glyciphilla fulvifrons** (*Gliciphila melanops chandleri*). Tawny-crowned Honey-eater.—Always to be found in the heathy country.

**Melliphaga phrygia** (*Zanthoniza phrygia tregellasi*). Regent Honey-eater.—Single bird seen near Anglesea River.

**Ptilotils chrysops** (*Paraptilotils chrysops beaconsfieldi*). Yellow-faced Honey-eater.—Very plentiful along the river and side creeks at Anglesea.

**Ptilotils sonora** (*Meliphaga sonora sonora*). Singing Honey-eater.—Many birds seen near the coast.

**Ptilotils leucotis** (*Nesoptilotils leucotis melanodera*). White-eared Honey-eater.—Very plentiful at Anglesea and Jan Juc.

**Ptilotils auricomis** (*Lophoptilotils melanops meltoni*). Yellow-tufted Honey-eater.—Very rare in our district; a bird seen near Scrubby Creek.

**Ptilotils penicillata** (*Ptilotula penicillata mellovi*). White-plumed Honey-eater.—Very plentiful.

**Lichmera australaslana** (*Phylidonyris pyrrhoptera indistincta*). Crescent Honey-eater.—Birds all through the saplings around Anglesea.

**Mellornis novæ-hollandiæ** (*Meliornis novæhollandiæ assimilis*). White-bearded Honey-eater.—Always to be seen in large numbers.

**Myzantha garrula** (*Myzantha melanocephala whitei*). Noisy Miner.—Keeps more to the open country, and is very tame around the farm-houses.

**Anthochaera carunculata** (*Coleia carunculata tregellasi*). Red Wattle-Bird.—Birds seen throughout the trip.

**Acanthogenys rufularis** (*Acanthogenys rufogularis cygnus*). Spiny-checked Honey-eater.—Bird seen on entering the forest at Jan Juc.

**Anthus australis** (*Anthus australis australis*). Australian Pipit.—Always plentiful on the grassy plains.

**Egintha temporalis** (*Egintha temporalis tregellasi*). Red-browed Finch.—Seen around Anglesea Hotel.

**Corvus australis** (*Corvus coronoides perplexus*). Australian Raven.—A few birds seen on the plains.

**Strepera anaphonensis** (*Neostrepera versicolor vieillotii*). Grey Bell-Magpie.—Generally to be seen in the burnt timber of the Jan Juc forest.

**Corcorax melanorhamphus** (*Corcorax melanorhamphus melanorhamphus*). White-winged Cough.—A fairly large colony seen flying across the ranges near the Big Hill.

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## Bird Ringing.

BY F. E. WILSON, R.A.O.U. (MELBOURNE).

At the monthly meeting of the Bird Observers' Club held on 17th March, 1915, the opinion was expressed by several members that, as very little was known regarding the movements of nomadic and migratory birds, an endeavour should be made to obtain some definite information upon the subject. A sub-committee,

consisting of Messrs. L. G. Chandler, A. C. Stone, George Finlay, and F. Erasmus Wilson, was appointed to consider the question and report to the Club at its next meeting. The recommendations of the sub-committee were accepted at the meeting held on 21st April.

As results must be looked for from all parts of Australasia, and even other countries, it was deemed advisable by the sub-committee that the work should be done under the management of the R.A.O.U. ; firstly, because from the Union's large membership many active workers might be enlisted, and secondly, because of its world-wide recognition. The Council of the Union agreed to take charge.

The most reliable way to obtain information upon the wanderings of birds is by attaching numbered rings to the legs of large numbers of specimens ; when this is carefully done it does not cause any inconvenience to the birds. This method is practised extensively by British and European investigators, who have gleaned some valuable information as a result.

If a bird were ringed in Victoria and the ring recovered in Japan, the registered number would establish the bird's identity. From information supplied by the person who ringed the bird and the person who recovered it, one might obtain the information that the bird was in Victoria in the summer and in Japan in the winter time. Should a bird belonging to a species known to winter in Manchuria, which was ringed in Victoria, be recovered in Java, it would point to the fact that a course *via* Java was the route of migration followed by this species. Of course, it would be necessary to get several records before the fact could be fully established, as occasionally heavy winds deflect birds from their course.

It was decided that rings should be marked thus :—  
No. 61 <sup>Inform</sup> R.A.O.U. each ring, of course, bearing a distinctive <sub>Melbourne,</sub> number. All rings distributed are to be carefully recorded, also their destination, and the person to whom they are issued will be expected to account for them. In the event of a ring being lost, the central body should be notified. The form of register to be kept at headquarters will be as follows :—

No. of Ring.	Species.	Sex (if known).	Nestling, Immature, or Adult.	Date.	Locality.	Ringed by	Result.

The sub-committee also suggested that a sheet should be supplied with each set of rings sent out, showing the numbers,

and ruled with the above columns, with the exception of that for the result. Upon the back of the sheet would be printed instructions as to procedure, the sheets to be returned when all the rings are used. As opportunities for ringing birds are not afforded every day, it was suggested that workers should notify the central body from time to time as to what rings they had utilized, with the various data required.

All people interested, whether members of the R.A.O.U. or not, who are willing to take an active part in this movement will be supplied with rings of different sizes to suit small and large birds, but it is hoped that members of the Union especially will help.

Most birds will probably be ringed as nestlings, but opportunities are sometimes afforded for ringing adult specimens. Occasionally birds find their way into houses; some may be found caught in rabbit traps; and, again, some tight sitters may often be caught upon the nest. Various other methods of capturing birds will suggest themselves. I caught a Brown Tit-Warbler (*Acanthiza pusilla*) that was held fast in a large spider's web.

It is particularly desired that all opportunities for ringing birds be availed of, whether the species be known wanderers or not. I would especially recommend the following birds as worthy of attention:—Wood-Swallows, Cuckoos, Kingfishers (*Halcyonidae*), Caterpillar-eaters, Leaden and Satin Flycatchers, Orioles, and Quail. Naturally, many rings will never be recovered.

Some rings will be available shortly, and all who are willing to help are requested to send their names and addresses to Mr. A. C. Stone, 71 Tivoli-road, South Yarra, Victoria. Finally, the initiators of the movement earnestly trust that no bird will be killed in order to recover a ring that may have been noticed upon its leg.

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### Proposed Second Edition of "Check-list."

RECENTLY a sub-committee was appointed by the Council of the R.A.O.U. to consider the advisability of preparing a second edition of the "Official Check-list of the Birds of Australia." The members were Dr. J. A. Leach and Messrs. D. Le Souëf, C.M.Z.S., A. H. E. Mattingley, C.M.Z.S., and Chas. Barrett, C.M.Z.S. At the meeting of the Council in April, 1915, the sub-committee presented its report, the recommendations being as follows:—

1. That it is deemed advisable to proceed with the preparation of a second edition of the "Official Check-list of the Birds of Australia." The main reason for this is that "A List of British Birds," compiled by a committee of the B.O.U., has just come to hand. It includes over 90 genera, more than one-quarter of the genera represented in Australia. Australian nomenclature must come into line with that used in Britain. The same name must be used for the same bird.

2. That a report be furnished to the next congress, to be held in Brisbane.

3. That only genera and species be dealt with. It is considered that the time is not opportune for a final treatment of sub-species, for much more still remains to be done, and many changes of name of sub-species may still be necessary.

4. That the Council accept without any change the names fixed by the B.O.U. for the 50 species of birds on the Australian list which are also included in the British list, and that the 80 generic names be accepted for birds of those genera common to Britain and Australia.

5. That a Committee to prepare a report be constituted as follows:—Capt. S. A. White, Dr. W. MacGillivray, Dr. J. A. Leach, Colonel W. V. Legge, Messrs. Chas. Barrett, A. J. Campbell, A. F. Basset-Hull, R. Hall, D. Le Souëf, G. M. Mathews, A. H. E. Mattingley, and R. A. Zietz.

6. That the B.O.U. list be taken as a model, and that the same kind of information be supplied about each species, including particulars as to the food, distribution, the pronunciation and derivation of scientific names.

7. That the vernacular names be considered with a view to their simplification. It is suggested that the Education Department of each State be asked to insert a request in the *Education Gazette* asking those interested to send local names to the R.A.O.U.

8. That the measurement of each bird, from tip of beak to tip of tail, be included in the notes on each species; that a bibliography be included.

9. That the only reference in the way of synonymy be to the R.A.O.U. list, Gould's "Birds of Australia," and the original description.

10. That a comprehensive introduction dealing with the principles of nomenclature and the chief characteristics of the Australian avifauna be included.

Suggestions from R.A.O.U. members with regard to the proposed second edition of the "Check-list" will be welcomed by the Council.

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### Camera Craft Notes.

So many members of the Union are interested in bird photography that it has been decided to devote space in each issue of *The Emu* to the subject. It is hoped that members will contribute notes and prints. As many photographs as possible will be published, but those of the rarer birds, nests, and eggs will, of course, be given preference. Notes on the behaviour of birds when faced by a camera, devices used to obtain photographs under difficulties, hints for the field and the dark room, and so forth, will be welcomed.

**Emu-Wrens in Tasmania.**—In November, 1914, I spent a few days in the Springfield district, Tasmania, where Miss J. A. Fletcher showed me several nests of Emu-Wrens (*Stipiturus malachurus*). At one of these nests, containing three nestlings about a week old, I spent several hours on a hot afternoon, but did not succeed in obtaining a photograph of the parent birds. The camera was concealed in a clump of sword-grass a few feet from the nest, with only the lens showing, while I remained hidden some four yards away, at the end of the rubber tubing attached to the shutter release. Time and again one or other of the Emu-Wrens approached the nest, always from the back of the tussock in which it was built, and crept around, like mice. They came silently, but, when startled by the least sound, flew away with a faint whirr of wing. The birds were anxious about their brood, but would not venture in front of the nest while the camera lens stared at it. On several occasions one or other of the birds carried food. The male dodged around for half an hour, carrying in its beak some small insects; eventually it disappeared, and doubtless ate the food itself. On the following day I tried my luck at another nest, which held eggs, but the result was not better. The birds were seen moving among the grass-stems within a foot of the nest, but declined to appear for even a moment at the "front door." I departed from Springfield without having exposed a single plate on an adult Emu-Wren.—CHARLES BARRETT. Melbourne, 10/6/15.

**Rare Photographs.**—The photographs by Mr. James Ramsay, Pitt-street, Sydney, New South Wales, reproduced in this issue, are of special interest. They comprise old male Satin Bower-Bird (*Ptilonorhynchus holosericeus*) at a bower in a deserted garden at Schofield's Creek, Barnard River, Scone district; Tawny Frogmouth (*Podargus strigoides*) and young (taken by flashlight), at Ashfield; and Yellow-bellied Shrike-Tit (*Falcunculus frontatus*) approaching nest. The prints were sent to the editors of *The Emu* by Mr. H. L. White, of Belltrees, Scone, in a letter to whom Mr. Ramsay states:—

"As regards difficulty, either the *Podargus* or the Shrike-Tit gave me more trouble, but the Satin-Bird easily eclipsed these as a test for patience; he was indeed a wily old bird. The first day I lay under some straggling grape-vines from 10 o'clock till 3.30, when a heavy shower put an end to any hope of securing an exposure. The second day I was ready earlier, and had everything in readiness by 9 o'clock, and never left my hiding-place till 3.45, when I exposed one plate just as the rain came down. The shutter, however, which had been set in the bright sunlight, proved too fast for the greatly reduced light, and I was not able to develop a good picture. During almost all the second day the old Satin-Bird was in sight, either in the casuarinas by the creek or actually in the old mulberry tree above the bower, and I dare



Satin Bower-Bird, ♂, at Bower.

FROM A PHOTO, BY J. RAMSAY.



not either alter the shutter or rise and stretch my legs. Luckily, I had gathered a supply of mulberries and had a pocketful of biscuits, so I managed to put in the day with only the inconvenience of a little stiffness. The last day (on which I stayed simply as a last hope of securing a picture) I made more of a shelter for myself, both to guard against the sun and to hide me from all sides, for inquisitive Rosellas (which came to feed on the dead thistles round the bower) and Leatherheads and numbers of *Strepera* used to peer at me from a distance of a few feet, and I fancied that they somehow alarmed the Satin-Bird, for he used



Yellow-bellied Shrike-Tit and Nest.

FROM A PHOTO. BY J. RAMSAY.

to investigate on all sides before coming into the mulberry tree, although the two females with him were far more trusting; but I never saw them take the slightest interest in the bower. There were many opportunities on the third day, but I only managed to expose three plates, as, after each exposure, I had to let the bird leave the bower, naturally, and it would be hours sometimes before he again got in focus. My great regret was that I had no cinematograph, as there were times when the bird was playing round the bower, rearranging feathers, &c., for as long as five minutes at a stretch."

**Simple Devices.**—The few brief months of the nesting season come and go, and at the end of the season, as the enthusiastic bird-photographer goes through his list of discarded negatives, he often thinks regretfully of the fact that eight or nine months may elapse before he will have another opportunity of pitting his skill with the camera against wild birds. However, this thought should not trouble him very much, for, by the exercise of a little patience and care, he can find plenty of opportunities for artistic work among the birds in almost any month of the year. In the summer, isolated pools of fresh water in scrubby country are almost certain to be used by birds for drinking and bathing.



White-bearded Honey-eater.

FROM A PHOTO. BY L. G. CHANDLER.

If a stick or stone be placed in the centre of one of these pools, birds coming to drink will invariably perch on it as the highest point of vantage.

Birds may be attracted by keeping a shallow tray, cut from an old kerosene tin, filled with clean water. Birds in the neighbourhood should be liberally fed with bread-crumbs. In the past few years I have secured a number of photographs through keeping a drinking tin in a convenient spot. A Yellow-breasted Shrike-Robin (*Eopsaltria australis*) was photographed while on the ground at Easter time, when I was accompanied by my friend, Mr. Maurice Thompson, R.A.O.U. We saw a pair of Robins feeding in an open situation, where a hole had been dug in the sandy soil, and in less than half an hour, after we had generously assisted the birds to obtain food, one had become so



Tawny Frogmouth and Young.

FROM A PHOTO. BY J. RAMSAY



tame that it accepted a grub from my companion's fingers. It is interesting to watch a Yellow-breasted Shrike-Robin when it is perched. Should the stick sway slightly, the bird's body sways in unison, but its head remains stationary. This enables the bird to focus its eyes on any desired spot.—L. G. CHANDLER. Malvern (Vic.), 15/5/15.

### Stray Feathers.

**Figs Eaten by Butcher-Bird.**—A few days ago I noticed a Collared Butcher-Bird (*Cracticus destructor*) devouring ripe figs. Whether the bird did so for the sake of the fruit only, or whether it was attracted, in the first instance, by the numbers of insects which infested the figs, I do not know. I have not before known these birds to eat fruit, but this season being exceptionally dry, with a great scarcity of insect life, might account for the change of diet.—L. G. CHANDLER. Melbourne, 21/4/15.

\* \* \*

**Extension of Locality.**—While working in the bush the other day, I observed a male Olive Whistler (*Pachycephala olivacea*), and, knowing that this species was supposed not to range further north than New South Wales, I thought that I might have made a mistake. However, further observations led to my sending this note to *The Emu*. The olive-brown back, dark grey head, white throat marked with brown, the faint grey band across the chest, and the reddish-brown under surface served as recognition marks.—NOEL V. I. AGNEW, R.A.O.U. Moreton Bay, Queensland.

\* \* \*

**Cockatoos in Western Australia**—Mr. E. A. Le Souëf states \* that he saw a flock of "hundreds of Bare-eyed Cockatoos (*Cacatua gymnopsis*)," apparently in the Moore River district of Western Australia. I should say that the Cockatoos were probably *Licmetis pastinator* (Western Long-billed Cockatoo), which, I know, still occurs about there, and also further north. I have never seen any other species of White Cockatoo about there, except *Licmetis*, and Mr. Le Souëf states that the birds he saw "were using their long bills to dig up yams," which certainly confirms my surmise. Apparently, no specimens were obtained for identification, and, if the birds were *Gymnopsis*, it is probably a first record for that locality, as I can find no previous mention of their having been observed there. Neither Mr. Lawson, in "A Glance at the Birds of the Moore River (W.A.)," † nor Mr. A. W. Milligan, in "Notes on a Trip to the Yandanooka District, Western Australia," ‡ mentions *C. gymnopsis*, but both speak of *Licmetis* as occurring in these localities.—TOM CARTER. Sutton, Surrey, England, 11/3/15.

\* *Emu*, vol. xiv., part 3, p. 172. † *Emu*, vol. iv., part 3, p. 132.

‡ *Emu*, vol. iv., part 4, p. 152.

**Lyre-Birds' Habits.**—In our district most of the farmers have reserved a little patch of native scrub, generally in a corner of a river or creek, which is nearly always occupied by a Victoria Lyre-Bird or two (*Menura victoriæ*), and it is painfully noticeable that the male birds always disappear first. This, of course, may be accounted for in many ways. It is open to doubt whether the majority of rabbit trappers would release a male bird in full plumage found in a trap (for birds are sometimes caught), and, again, the male makes its presence known by its mimicry, which attracts the man with the gun, who seeks such spots for rabbits. It is particularly interesting to note the life the female birds lead when deprived of their consorts, and I have known, and still know of, many such cases. Every year the females construct their nests, lay, and sit till assured that they are only wasting time, when they desert; this is repeated while the females live. I have known a female Lye-Bird, when surprised in the bush, to take refuge in a hollow log where the hole was too small for most dogs to follow, and future investigation showed that the bird had emerged safely. A young bird was found dead in its nest and still warm immediately after a violent burst of thunder. Mr. A. H. Edwards, of Glen Alvie, has a female Lyre-Bird, which, apparently having lost her mates, has taken up her abode with the domestic hens, and causes much amusement by her mimicry (for the females can also mimic creditably even for a Lyre-Bird, which is saying much). The bird was still alive and thriving when last I saw Mr. Edwards.—L. C. COOK. Poowong (Vic.), 13/5/15.

\* \* \*

**Notes from Poowong (Vic.)**—A pair of Tawny Frogmouths (*Podargus strigoides*) has nested for five consecutive years in the same nest, just below our house. Just before the young leave, both the parent birds sit together on the nest for a week or ten days. In warm weather they appear to be very uncomfortable sitting as best they can on their frail structure, with the fluffy nestling bunched in between them. Possibly this is due to impetuosity on the part of the male bird, who has been kept away for so long. This has happened four years out of the five. The first year I removed a young bird, and my sister reared it. Each season, when mating, Frogmouths are much in evidence at night time, and it has become a custom with them to sit on a fence a few feet from my bedroom window and repeat again and again their monotonous "Too-roo, too-roo." They start this call very faintly, swell it as they proceed, then allow the sound to die away again, till finally it ends as faintly as it began. At a very short distance the call sounds like "Oom-oom-oom," but "Too-roo, too-roo" is the best way I can describe it. The call was made by both the birds that we had in captivity. They repeat this call as many as 45 times, at all events in the nesting season. A few weeks ago when on a visit to what we call the open country, between Nyora

and Lang Lang stations, I was surprised and delighted to find some Satin Bower-Birds (*Ptilonorhynchus holosericeus*) in the river-bank scrub. This is the first occasion I have ever known these birds to visit the locality, where it would be safe for them to nest, and suitable, too.—L. C. COOK. Poowong (Vic.), 13/5/15.

\* \* \*

**Calls of the Tawny Frogmouth and Boobook Owl.**—I was pleased and interested with the notes on birds of the Wangaratta district, Victoria, by Miss G. M. Cheney, which appeared in *The Emu*,\* and I am glad to know that another enthusiastic observer is in the field. There cannot be too many observers. On one point—namely, the call of the *Podargus*—I must beg to differ from Miss Cheney. I am familiar with the Southern Frogmouth (*Podargus strigoides rossi*), as there are specimens on our property at the Reedbeds, near Adelaide, that are quite tame both by day and night, and I am also familiar with the Boobook Owl (*Ninox boobook marmorata*). Specimens of the latter species perch on clothes-line posts and other points of vantage at night, where they can watch for the mice that come to eat the seed given to the birds in our large aviaries. I have spent much time in studying the habits and listening to the calls of both species. I am still of opinion that the “More-pork” notes are uttered by the Boobook Owl, and that the Frogmouth does not use this call, but utters notes which sound like “Boo, boo, boo, boo,” continually repeated, and resemble somewhat the notes of the Bronze-winged Pigeon (*Phaps chalcoptera*), only given in a softer and more dreamy way. I have often stood beneath a tree from which a Frogmouth was calling. I have, also, scores of times been within a few yards of a Boobook Owl and “seen” it calling. One night, while I was watching, motionless, a bird settled on my head, and on another occasion, while I was waiting to get a shot at some Ducks at the edge of swamps at the Reedbeds, a Boobook Owl settled on my gun-barrel. I mention these facts to show that I am as familiar with the birds in question as I am with barn-door fowls in the yard. I am of the opinion that Miss Cheney heard the call of the Owl and mistook it for that of the Frogmouth.—J. W. MELLOR. Fulham, Adelaide (S.A.), 12/5/15.

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**Field Notes from Dumbleyung, W.A.**—The following interesting notes are extracted from two letters received by Mr. W. B. Alexander, M.A., Keeper of Biology, Western Australian Museum, Perth, from his correspondent, Mr. Martin W. Elliott, of Dumbleyung, near Wagin, W.A. :—

“*Restless Flycatcher (Seisura inquieta).*—Of this species Gilbert wrote :—‘ Its most singular note is that from which it has obtained

\* *Emu*, vol. iv., part 4, pp. 199-213.

its colonial name, and *which is only emitted while the bird is in a hovering position at a few feet above the ground.*' This has often been quoted—*e.g.*, by Mr. Robert Hall in his 'Useful Birds of Southern Australia.' Granting that it is usual for the bird to hover while giving out its peculiar whirring note, to say that it does so at no other time is absolutely wrong. I have several times seen the bird perched while doing so. To give one particular instance. Last season, while burning off, I heard one of these birds strike up its whistle. I looked round, expecting to see it on the wing close to me, but it was not there. Then I caught sight of it some 20 yards away, seated on a piece of burnt poison bush. After some time it flew to a dead mallee sucker and continually let forth its whirr. The bird was about me for fully half an hour, and whistled as much while perched as when hovering. He was the only one present, and, as the nearest timber was 200 yards away, it could not have been from another bird. Further, I could see his throat moving. Afterwards I observed other birds give off their whirring note while perched, although none of them in so marked a manner as this one. The Flycatcher apparently does not nest just in this immediate neighbourhood, but every year, before the breeding season, numbers of them arrive and stay for some time. Dumbleyung, near Wagin, W.A., 25th March, 1915.

"I have been fortunate enough to make two further observations of the Restless Flycatcher, and I think they will prove that my previous statements were correct. The following is my rough note of the first instance:—'18th April, 1915, 8 a.m.—Restless Flycatcher came across from water-hole, hovering over bushes on way, but silent. Flew behind stable and whirred while hovering, then perched on lower wire of small paddock fence (two-wire fence, lower wire 2 feet 6 inches from ground), and whirred for about 25 seconds; flew chain further along and perched on top wire (3 feet 6 inches from ground) and whirred for 30 seconds, then flew to road. No time to follow him. Times of whirring note approximate. These were the distinct whirring notes, and not the preliminary whistle.' The second observation I made this morning on the Dongolocking Road. I heard one of these birds, and pulled up my horse. It crossed the road and perched on a dead mallee about 5 feet high, and whirred for 15 seconds. Flying a couple of chains, it rested on a small bush, and whirred for 12 seconds; then, proceeding to a mallee some 10 feet from the ground it whirred for 28 seconds, and then, going to a lower bush, it whistled for 20 seconds. I took these four times by a second hand of my watch, but, as I had to keep one eye on the bird and the other on my horse (as I was driving a sulky and this sand-plain is plentifully interspersed with mallee and black-boy), I could not take further times, but followed the bird for 10 minutes, and during that time it repeatedly whistled while perched, but only did so twice while in the hovering position. In case it might be urged that this was a solitary bird, and perhaps

suffering from some injury which caused it to perch frequently, I would point out that this spot is 7 miles from where I made my observations on the 18th inst. I have further noticed that when the bird gives a short whirr it is neither so loud nor so clear as the longer one—in fact, in the longer call, say of 30 seconds' duration, it almost seems as though the bird is in reality getting up speed. 19th April, 1915.

“*Tawny Frogmouth (Podargus strigoides)*.—The Boobook Owl may say ‘More pork,’ but to say that the Frogmouth *does not* is quite incorrect. I have heard it give the cry scores of times. 25th March, 1915.”

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### From Magazines, &c.

**Captives Set Free.**—In *Bird Notes and News*, vol. vi., No. 5. Mr. W. H. Hudson, F.Z.S., has a charmingly written article entitled “On Liberating Wild Birds.” Those who believe that it is foolish to give caged birds their liberty because they will be mobbed and killed by wild birds may change their opinion on reading of Mr. Hudson’s experience. He was at Seaford for a few days, and noted in the landlady’s kitchen a Bullfinch in a cage that had not been cleaned for many days. Mr. Hudson cleaned out the cage, hung it in a shady place, and gave the Bullfinch greenstuff daily. On the day of his departure he put the bird in a cardboard box. The woman remonstrated, saying that her husband would be angry when he returned home, but put in her purse the half-crown that Mr. Hudson laid on the table in payment for the bird.

“At Lewes,” writes Mr. Hudson, “I got out of the train just to give the bird its freedom. I had thought of the Abbey garden as an ideal spot for the purpose; it was private, shaded by trees, full of wild birds, and the keeper I knew as a bird-lover. Once inside the grounds I opened the box, and the Bullfinch fluttered out on to the grass. He appeared wild with astonishment, craning his neck and looking all round, then fluttering a yard or two further away, but unable to fly. Presently he recovered a little from his excitement and began to examine the grass and herbage about him, and then to taste the green buds and leaves. This tasting occupied him some time, and at intervals he looked up and piped his little plaintive note, now becoming louder each time it was uttered. Then all at once the impulse to fly came to him, and, first fluttering over the grass, he succeeded in rising and flew straight away to a distance of 40 or 50 yards, where a stone wall, a remnant of the ancient Abbey, stood in his way. He failed to rise high enough to get over, and so came fluttering to the ground. There he again began looking about him, and, finding something to his liking, spent two or three minutes in biting at it. Then once more he was seized with the desire to fly, and on this occasion rose higher and flew further, and finally

settled on a low branch of an elm tree. There the wind caught him and almost upset him, but it appeared to have an exhilarating effect: his piping note became louder and fuller, and he began flying from branch to branch, rising higher each time, until he was at the very top of the tall old tree, swayed on his perch by a high wind, and uttering his note with, I imagined, a ring of happiness in it. The point that chiefly concerns us here is, that during the whole time I spent in watching the Bullfinch and his rapid recovery from the debilitating effects of his long months of confinement, no wild bird came near or appeared to take any notice of him. Yet it was a birdy place, as I have said; there were Sparrows in scores, Starlings, Thrushes, Chaffinches, cruising about in all directions, and Tits and Warblers of two or three kinds moving about in the foliage. And, as in this instance, so it has been in every case when I have set a caged bird free in a spot abounding with wild birds."

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**Pectoral Rails in Captivity.**—An article by C. Barnby Smith, in the February, 1915, issue of the *Avicultural Magazine*, contains the following interesting notes on the Pectoral Rails (*Hypotaenidia philippensis*):—

"When I left home for Iceland early last June, I had what I hoped was a true pair of Australian Pectoral Rails nesting in a grass tuft in a small run. One bird was 'sitting like a stone' on four eggs, and I hoped for good results. Unfortunately, a rat made an inroad during my absence and killed the sitting bird. On my return, I found that, owing to this and other tragedies, things had got rather mixed, and the surviving Rail had been moved into a larger run (about 9 yards by 16 yards), where there were a lot of other Waders, including another Pectoral Rail. The surviving Rail was sitting closely in a tuft of grass on eggs believed by my man to be six in number. Thinking these eggs were certainly all clear, I somewhat stupidly had the bird frightened off the nest, and gave instructions for the eggs to be put on a table in the potting shed, to present to a schoolboy in due course. When the man went to the nest for the eggs only four were found, although six had previously been seen. As these Rails are always destroying their eggs, this was not surprising. The eggs were removed at 9.30 a.m. on Tuesday, 14th July; at 2.45 p.m. the same day my man heard a chick trying to break through the shell of one of the eggs removed. He at once took all four eggs back to the nest, and then discovered that the two missing eggs had previously been converted into two little balls of black fluff, and the old bird had taken these chicks back to the nest and was brooding them there. The four eggs were replaced in the nest, and the following morning two more chicks were hatched (the other two eggs being clear).

"The difficulty of feeding the chicks then commenced. In the first place, it was often most difficult even to find the parent

birds, and when found the chicks for the first few days would scatter in all directions, more often than not making frantic efforts to get through the  $\frac{3}{4}$ -inch mesh wire-netting enclosing the run, and on various occasions I rescued chicks that had pushed through and failed to return. The parent birds would at my approach display the greatest agitation—the cock very slightly setting up his feathers and rushing off with loud ‘clacks’ of indignation, whilst the hen, with similar ‘clacks,’ and with lowered head and wings, and feathers on the back erected, would repeatedly charge at me, especially if a chick was heard to cry. It would be of great interest to have had a photograph of the hen Rail while charging: she looked something like a Ruff in the breeding season, and the greatest possible contrast to the torpedo-shaped bird as I usually see her at other seasons, shrinking away through the grass at the slightest noise. The cock bird usually kept quite near the hen, but I never actually saw him brooding the chicks. For a fortnight I spent a good deal of time throwing crumbled hard-boiled egg, scalded gentles, finely-chopped meat, poultry food, and other dainties in open spaces where I hoped the Rails and not other birds would find them. It was most interesting, when I could watch unseen, to notice the hen bird coming out to fetch pieces of this food or catching flies with which to feed the young. I could always tell when the young were near, and I was unnoticed, by her constant low ‘grunts’ calling them—a striking contrast to the angry ‘clacks’ of one or both parents as soon as danger was suspected. One of the chicks died at the end of about a week, and one when partly feathered. The other two flourished greatly, but just before getting feathered were the ugliest birds I ever saw in my life. The down with which they were hatched did not seem to have increased at all, and as the birds grew prodigiously they became straggling, black-skinned, semi-nude objects. I often failed to find one or other of them for a week or so at a time, and it was interesting to notice that the young birds and their parents made long tunnels in the coarse-growing grass all over the run, as though the place had been infested with rats. A systematic hunt by several persons with sticks to poke in every tuft of grass was the only way of ascertaining what birds were there. The greatest care had to be exercised to avoid treading on the chicks.”

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### Reviews.

[“Nests and Eggs of Birds Found Breeding in Australia and Tasmania.”]

“NESTS and Eggs of Birds Found Breeding in Australia and Tasmania,” by A. J. North, printed by order of the Trustees of the Australian Museum, commenced in 1904, has at last been completed. I purpose criticising the work from the point of view of amateurs, many of whom, like myself, take a keen interest in

field observations, but are not sufficiently advanced to discuss the more scientific side of ornithology. I possess what is probably the most complete collection of Australian birds' eggs in the world. So many of the species included in it have been ignored by Mr. North that I feel justified in going rather fully into the matter. For many years I have employed some of the best collectors in exploring almost every part of Australia for undescribed eggs, and in all cases I have paid particular attention to the identification of everything; I am, therefore, qualified to express an opinion upon the subject.

Everyone must admit that where Mr. North has treated a species the work has been exceedingly well done; but the trouble is—(1) so much has been left out, and (2) so much inconsistency shown, that the good points of the book become overshadowed to a considerable extent by its faults. As the appended list shows, no fewer than sixty recognized species, or sub-species, actually found breeding in the Commonwealth, receive no mention whatever, some glaring instances being:—*Eulabeornis castaneiventer*, *Ninox strenua*, *Podargus marmoratus*, *Atrichia rufescens*, *Micræca assimilis*, *Megalurus striatus*, *Amytornis woodwardi*, *Collyriocichla woodwardi*, *Neositta striata*, *Zosterops lutea*, *Lacustroica whitei*, and *Mirafra rufescens*. The omission of the *Atrichia* is inexcusable, both bird and eggs being known for many years. Why no *Micræca* or *Megalurus* is recorded for Western Australia is another mystery. Many other curious omissions are noted in my attached list.

Under the heading of inconsistency, we find 15 cases in which birds are described but their eggs omitted. In three instances Gould's descriptions of eggs are used, while in others they are ignored. Birds found breeding outside Australia only have, in the case of *Gygis alba* and *Procelsterna cinerea*, been fully written up, while others equally worthy of mention are omitted. In some instances sub-species are recognized, in others disregarded. Two remarkable instances of inconsistency may be noted in the treatment of the species *Eremiornis carteri* and *Lacustroica whitei*, both of which forms were first described by Mr. North. *Eremiornis carteri*, whose eggs are unknown, receives a two-page article in "Nests and Eggs," while *Lacustroica whitei*, whose eggs were described in *The Emu*,\* is not even mentioned.

In 1889 a book entitled "Descriptive Catalogue of the Nests and Eggs of Birds Found Breeding in Australia and Tasmania," by A. J. North, was published by the Trustees of the Australian Museum. In it we find the species *Synæcus cervinus* (Gould) and *Eulabeornis castaneiventer* (Gould) listed, and their eggs described; the present publication ignores them. Eggs of *Cladorhynchus leucocephalus* (Vieill.), *Geocichla macrorhyncha* (Gould), *Acanthiza inornata* (Gould), and *Neositta tenuirostris* (Gould) were described in the 1889 catalogue, but are not mentioned in the new work.

\* *Emu*, vol. ix., pp. 166 and 209.

Under the heading of non-recognition of contemporaries, it may be noted that in "Nests and Eggs" one single reference only to *The Emu* and Mr. Milligan can be found; eminent authorities such as Campbell, Hull, Mathews, and others might just as well have never lived for any credit they receive.

This work might very properly be entitled "Nests and Eggs of Some of the Birds Found Breeding in Australia and Tasmania and Elsewhere."

In the accompanying list I draw attention to any omission, inconsistency, &c., that has come under my notice while studying Mr. North's book:—

**Catheturus purpureicollis** (Le Souëf).—Eggs of this bird were described in *The Ibis* of 1898, p. 52. Description should have been in its proper place in the book, and not in the Appendix.

**Synœcus sordidus** (Gould), **Synœcus cervinus**.—Sub-species of *S. australis* (eggs well known), recognized by other authorities; omitted by Mr. North.

**Turnix castanonota** (Gould).—Bird distinct, and well known. (Eggs described in *Emu*, ii., p. 94.) Not mentioned by Mr. North.

**Turnix olivei** (Robinson).—Omitted; eggs unknown.

**Leucotreron alligator** (Collett).—Bird distinct, but eggs unknown. Why should Mr. North include a sub-species like *Chalcophaps occidentalis*, whose eggs are undescribed, and leave out such a remarkable form as *L. alligator*?

**Chalcophaps occidentalis** (North).—Probably synonymous with *C. longirostris* (Gould). Mr. North devotes a paragraph to it, but does not mention the eggs.

**Petrophassa rufipennis** (Collett).—Another distinct species; eggs unknown. Omitted by Mr. North, but surely more worthy of inclusion than the last preceding sub-species.

**Eulabeornis castaneiventer** (Gould).—Omitted. Bird well known. Eggs mentioned in A. J. Campbell's "Nests and Eggs"; authentic specimens, taken at Melville Island, N.T., in my collection.

**Puffinus assimilis** (Gould).—Bird described, but no mention of Australian-laid eggs.

**Puffinus carneipes** (Gould).—To be consistent with the title of his book, Mr. North should have recorded the Western Australian habitat only of this bird; the Lord Howe Island form is a sub-species—*P. carneipes hulliornis* (Mathews). If some of the Lord Howe Island birds are included, why omit *Merula*, *Aplonis*, and others?

**Puffinus gavia** (Forster).—Bird mentioned, but nothing said about its eggs.

**œstrelata solanderi** (Gould).—If birds (Petrels, &c.) with Australian visiting records are elsewhere included (e.g., *Procelsterna cinerea* and *Gygis alba*), why not include this species, which breeds on Lord Howe Island and visits Australia?

**Sterna fuliginosa** (Gm.).—Why devote two pages to the Lord Howe and Norfolk Island breeding-places of this species, and only three brief paragraphs to its Western Australian haunts?

*Procelsterna cinerea* (Gould).—Mr. North devotes  $1\frac{1}{2}$  pages to this bird, which, he admits, has not been seen on any Australian coast.

*Gygis alba* (Sparrin).—Like the preceding, Mr. North admits that this bird has not been seen in Australian waters, yet he gives two pages of description. Why should this form receive so much attention while our regular visitors are completely ignored?

*Larus novæ-hollandiæ* (Steph.).—No reference made to the well-known mutations in colour of eggs—viz., blue without markings, or white with red markings.

*Phaethon rubricauda* (Boad.).—A long description given of the breeding habits of the bird at Lord Howe and Norfolk Islands, but no mention made of Australian-laid eggs.

*Cladorhynchus leucocephalus* (Vieill.).—Bird mentioned, but eggs not described in the present work, though they are noted in Mr. North's 1889 catalogue.

*Numenius cyanopus* (Vieill.).—Bird omitted; eggs in my collection, taken in North-West Australia.

*Astur eruentus* (Gould).—Bird described; eggs not mentioned, though common.

*Ninox lurida* (De Vis).—Omitted, though recognized by others. Mr. North includes two other sub-species of *Ninox boobook*. Why omit this? Eggs known.

*Ninox strenua* (Gould).—This is one of Mr. North's most extraordinary omissions. The bird is distinct, well known, and the eggs were described in *The Emu*.\* In several instances Mr. North has described sub-species without mentioning their eggs; here we have a most distinct species, whose eggs are known, entirely overlooked.

*Ninox rufa* (Gould).—The omission of this species is hardly such a glaring case as *Ninox strenua*; still, the bird is well known. I have eggs in my collection.

*Ninox humeralis* (Homb. and Jacq.).—Omitted; bird known.

*Strix castanops* (Gould).—Omitted; eggs not known, but the bird is surely worthy of mention.

*Strix tenebriosa* (Gould).—Omitted; eggs known.

*Trichoglossus septentrionalis* (Robinson).—Omitted; eggs described.†

*Cyclopsittacus maceoyi* (Gould).—Omitted. Eggs described in Campbell's "Nests and Eggs," p. 599.

*Platyercus nigrescens* (Ramsay).—Bird described, but no mention of eggs.

*Platyercus amathusia* (Bpt.).—Bird described, but eggs omitted; specimens are in my collection.

*Platyercus splendens* (Gould).—Bird mentioned, but not eggs.

*Platyercus icterotis* (Kuhl.).—One of the few cases where Gould's description of eggs is used; he is mostly ignored in this connection. In three notable cases—viz., *Synæcus cervinus*, *Eulabeornis castaneiventris*, and *Acanthiza inornata*—Gould describes birds and eggs, while Mr. North omits both.

\* *Emu*, vol. xii., p. 21.

† *Vict. Nat.*, vol. xvii., p. 148.

**Barnardius occidentalis** (North).—Mr. North here takes the opportunity of bringing in one of his own sub-species, but does not mention the eggs, a clutch of which is in my collection.

**Barnardius maegillivrayi** (North).—The same remarks apply as in the case of *B. occidentalis* (North).

**Psephotus pallescens** (Salvad.).—Bird mentioned, but not eggs.

**Psephotus dissimilis** (Collett) and **Psephotus chrysopterygius** (Gould).—Two well-known forms, both omitted; should be as worthy of a place as *Pezoporus flaviventris* (North). The first-named bird nested in the Sydney Zoological Gardens. Eggs from the Northern Territory are in my possession.

**Pezoporus flaviventris** (North).—A sub-species of *P. terrestris*. It is described, but not the eggs, though these were described in *The Emu*, vol. xiii., p. 186.

**Geopsittacus occidentalis** (Gould).—Omitted, though of more interest than *Pezoporus flaviventris*. This is one of our almost extinct forms, and, although the eggs are unknown, the bird should be worthy of a description.

**Podargus marmoratus** (Gould).—A distinct species; omitted by Mr. North. Eggs described in *The Ibis*, 1899, p. 361.

**Ægotheles rufa** (Hall).—Omitted. Eggs described in *The Emu*, vol. viii., p. 61.

**Ægotheles leucogaster** (Gould).—Omitted. Eggs in my collection.

**Dacelo maclennani** (North).—Omitted. Eggs in many collections.

**Cacomantis castaneiventris** (Gould).—Recognized by other authorities, but not by Mr. North. Egg described in *The Ibis*, 1899, p. 362.

**Chalcooecyx malayanus** (Raffl.).—Included; but said by Mathews to be extra-limital (*Austral Avian Record*, vol. i., pp. 18, 19).

**Chalcooecyx minutilus** (Gould).—Omitted. Eggs known. Other authorities give this as a distinct species.

**Pitta simillima** (Gould).—Bird and eggs described, but no locality given for the latter.

**Atrichornis clamosa** (Gould).—Not mentioned, though other writers claim it to be one of the most interesting of Australian birds. The eggs being unknown, Mr. North evidently decided not to touch the bird, though, as previously pointed out, he is quite inconsistent upon this point.

**Atrichornis rufescens** (Ramsay).—Omitted. The excuse of eggs being unknown cannot apply in this case, as they have been described by A. J. Campbell in his "Nests and Eggs," also in *The Emu*, vol. x., p. 327. Mr. North should have given S. W. Jackson some credit for his splendid work in connection with this bird.

**Petrœca campbelli** (Sharpe).—Bird referred to (vol. i., p. 164), but no description of eggs given.

**Petrœca ramsayi** (Sharpe).—Not included, though recognized by others.

**Petrœca picata** (Gould).—In vol. i., p. 171, Mr. North considers this to be synonymous with *P. bicolor* (Vig. and Hors.), and very properly gives his reasons; why not have followed this course in all cases, and thus made his work more interesting and valuable?

*Pseudogerygone cantator* (Weatherill).—Bird omitted, though both it and eggs are well known.

*Pseudogerygone lævigaster* (Gould).—Omitted. Eggs described in *The Emu*, vol. ii., p. 144.

*Pseudogerygone chloronota* (Gould).—Omitted. Eggs described in *The Emu*, vol. ii., p. 145.

*Pseudogerygone flavida* (Ramsay).—Bird mentioned, but not eggs.

*Rhipidura phasiana* (De Vis).—Omitted. Eggs described in *The Emu*, vol. iii., p. 54.

*Rhipidura phasiana* (De Vis).—This is an instance where Mr. North includes some sub-species and ignores others. He admits *R. albiscapa*, *R. albicauda*, *R. preissi*, but leaves out *R. phasiana*.

*Arses kaupi* (Gould).—Bird included, but eggs not mentioned; they were described in *The Ibis*, 1896, p. 156.

*Piezorhynchus leucotis* (Gould).—Omitted, though recognized by other writers. Eggs unknown.

*Monarcha canescens* (Salvad.).—Omitted; eggs known.

*Coracina lineata* (Swains.).—Should have been in its proper place in the book, not in the appendix.

*Drymacædus pallidus* (Sharpe).—In this case Mr. North very properly gives his reasons for omitting; why not have done so wherever there is a doubt?

*Calamanthus isabellinus* (North).—Bird mentioned, but eggs omitted.

*Oreocichla euneata* (De Vis).—Why is this omitted and *O. heinei* included? Eggs described in *The Emu*, vol. viii., p. 542.

*Oreocichla macrorhyncha* (Gould).—Omitted, but reasons stated.

*Megalurus striatus* (Milligan).—Omitted. Eggs described in *The Emu*, vol. xi., p. 249. Mr. North mentions no *Megalurus* for Western Australia.

*Eremiornis carteri* (North).—A remarkable instance of Mr. North's inconsistency. The bird is certainly distinct, but so are many others which he omits, under the excuse, apparently, that he has not seen the eggs. The eggs of this species are unknown.

*Acanthiza inornata* (Gould).—Bird mentioned, but not the eggs.

*Acanthiza albiventris* (North).—Bird and eggs described (vol. i., p. 276), but not indexed. Mr. North's description of this bird (vol. i., p. 276) has caused some confusion. A series of specimens in my collection, taken not far from Dubbo, the type locality, show no white under tail coverts. A bird in the Australian Museum, taken at Dubbo, but not labelled type (the type could not be found), likewise shows no white under tail coverts, and is apparently identical with my specimens.

*Acanthiza squamata* (De Vis).—Omitted. Eggs described in *The Emu*, vol. viii., pp. 261–284.

*Acanthiza robustirostris* (Milligan).—Omitted, though the bird is distinct, and eggs described in *The Emu*, vol. ix., p. 197.

**Acanthiza pallida** (Milligan).—Omitted. Bird and eggs are well known.

**Acanthiza tenuirostris** (Zietz).—Included, but eggs not mentioned; they were described in *The Emu*, vol. ix., p. 136.

**Sericornis minimus** (Gould).—Omitted. Eggs described in *Victorian Naturalist*, vol. xvii., p. 147.

**Sericornis lævigaster** (Gould).—Omitted. Eggs in my collection.

**Malurus elizabethæ** (Campbell).—Omitted, though recognized by other authorities.

**Malurus dulcis** (Mathews).—Omitted. Eggs in my collection.

**Malurus coronatus** (Gould).—Receives a brief notice, but eggs not described, though known. This is one of the most distinct and interesting forms of the genus. *Vide Emu*, vol. xiv., p. 59.

**Stipiturus ruficeps** (Campbell).—Mr. North refers to the bird (vol. i., p. 243), but does not mention the eggs.

**Stipiturus mallee** (Campbell).—Omitted. Eggs described in *The Emu*, vol. x., p. 336.

**Amytornis gigantura** (Milligan).—Omitted. Eggs described in *The Emu*, vol. ix., p. 202.

**Amytornis woodwardi** (Hartert).—Omitted. One of the most distinct forms of the genus. Eggs described in *The Emu*, vol. xiv., p. 58.

**Amytornis goyderi** (Gould).—Omitted. Eggs known.

**Collyriocichla woodwardi** (Hartert).—Omitted. A very distinct species. Eggs described in *The Emu*, vol. xiv., p. 57.

**Gymnorhina longirostris** (Milligan) and **Gymnorhina dorsalis** (Campbell) are omitted by Mr. North without any explanation; they are recognized by other authorities.

**Cracticus spaldingi** (Masters).—Bird mentioned, but eggs not referred to, though described in *The Emu*, vol. v., p. 62.

**Cracticus argenteus** (Gould).—Same remarks apply as in last preceding species.

**Falcunculus whitei** (Campbell).—Omitted. Eggs described in *The Emu*, vol. xiv., pp. 58, 59.

**Pachycephala peninsulæ** (Hartert).—Omitted. There is some doubt as to where this bird should be placed. Mathews forms a new genus for it under the name of *Mattingleya*. Mr. North does not assist us. Eggs described in *Victorian Naturalist*, vol. xvii., p. 148.

**Pachycephala pallida** (Ramsay).—Omitted. Eggs well known.

**Pachycephala fretorum** (De Vis).—Bird mentioned, but not eggs.

**Pachycephala lanioides** (Gould).—No reason why this description should be left to the *Appendix*. Mr. North describes a single egg presented to him by me, while he ignores my *type pair* described in *The Emu*, vol. viii., p. 143.

**Eopsaltria georgiana** (Q. and G.).—Bird included; eggs omitted, though well known and described in Campbell's "Nests and Eggs," p. 148.

*Aphelocephala pectoralis* (Gould) and *A. nigricincta* (North) are claimed to be synonymous by Mathews (*Austral Avian Record* vol. ii., p. 131). Mr. North omits all mention of the first-named, which, if Mathews is correct, holds priority.

*Aphelocephala castaneiventris* (Milligan).—Omitted. Eggs common. Another of Mr. Milligan's forms ignored by Mr. North. In one case only has Mr. North recognized this well-known authority.

*Neositta albata* (Ramsay).—Mr. North apparently places this with *N. leucocephala*, though he records no specimen from North Queensland. Other authorities separate the birds.

*Neositta tenuirostris* (Gould).—Omitted. Recognized by other authorities. Listed, and eggs described, by Mr. North in his 1889 catalogue.

*Climacteris melanonota* (Gould).—Omitted. Surely worthy of a place, if only for its historic association with Gilbert. Though the eggs are undescribed, this fact has not deterred Mr. North from describing less interesting birds.

*Zosterops gouldi* (Bp.).—One of the few instances where Gould's description of eggs is used.

*Zosterops lutea* (Gould).—Omitted. Eggs described in *Victorian Naturalist*, vol. xviii., p. 31. Mr. North records no *Zosterops* for the Northern Territory or for Western Australia other than its south-east portion.

*Zosterops gulliveri* (Cast. and Ramsay).—Omitted. Eggs described in *The Emu*, vol. ii., p. 146.

*Zosterops ramsayi* (Masters).—Omitted.

*Pardalotus pallidus* (Campbell).—Omitted. Eggs described, *Emu*, vol. viii., p. 142.

*Melithreptus vinitinctus* (De Vis).—Omitted, though admitted by other authorities. Eggs undescribed.

*Lacustroica whitei* (North).—Omitted. Eggs described in *The Emu*, vol. ix., p. 166. Presuming that "Nests and Eggs," by A. J. North, was published with a view to educational purposes, its value is discounted to a very great extent by the numerous unexplained omissions. If Mr. North disagreed with other authorities, why does he not give his reasons?

*Ptilotis carteri* (Campbell).—Omitted. Eggs well known. Quite as worthy of mention as *Ptilotis leilavalensis* (North); they are both probably sub-species of *Ptilotis penicillata* (Gould).

*Myzantha lutea* (Gould).—This is a case where an explanation would be of service to the amateur. Mr. North dismisses the bird with a very brief paragraph, and does not mention the eggs.

*Entomyza harterti* (Robins and Laver).—Omitted, though included by others. Eggs known.

*Mirafra rufescens* (Ingram).—Omitted. Eggs known. Mr. North records no *Mirafra* for the Northern Territory.

*Munia pectoralis* (Gould).—As pointed out in *The Emu*, vol. xiii., p. 215, I think Mr. North is wrong in describing the eggs of this species as having a slight bluish tint; several authentic sets in my possession are pure white, as are eggs of other species of the genus.

*Oriolus affinis* (Gould).—Omitted. Eggs known. This sub-species is recognized by others.

*Scenopæetes dentirostris* (Ramsay) and *Prionodura newtoniana* (De Vis).—Mr. North described these birds in his vol. i., when the eggs were unknown; in his Appendix appears a very full description of the eggs and nests. Why not have adopted a similar course in other cases?

*Strepera graculina* (White).—Mr. North gives the clutch as three, but four eggs are frequently laid.

*Ashbyia lovensis* (Ashby).—Omitted. Quite as worthy of mention as *Eremiornis carteri* (North).

H. L. WHITE.

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[“Stories from Nature.” By J. A. Fletcher. Macmillan and Co.]

UNLIKE some writers of nature stories, Miss Fletcher is a true naturalist, as papers from her pen published in *The Emu* testify. She has observed birds and other wild creatures in their haunts, and her little book bears the sign-manual of the open air. It is pleasantly written, too, and should delight young readers, for whom it is chiefly intended. The volume opens with an account of the adventures of “Tommy Oyster-catcher,” and other birds dealt with in following pages include Rosellas, Dottrels, Native-Hens, and Bronze-Cuckoos. “An Evening Ramble” is one of the best chapters. The half-tone illustrations, from photographs by the author, Mr. A. H. E. Mattingley, and others, are excellent. The book would make a capital gift for a boy or girl interested in nature study.

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[“A List of British Birds,” compiled by a committee of the British Ornithologists’ Union. Second and revised edition. Published by the British Ornithologists’ Union, and sold by Wm. Wesley and Son, 28 Essex-street, Strand, London, W.C. 1915.]

THIS list was received by Australian ornithologists with feelings of relief. Over ninety—more than one-quarter of the genera represented in Australia—are included in the British list or its appendices. As the same name must be used for the same bird wherever it is found, one-quarter of the Australian generic names are thus fixed, and further the standard of generic distinction for the whole is also thus practically fixed.

With the example before it of a second edition of the B.O.U. list, and a third edition of the A.O.U. “Check-list,” a committee of the R.A.O.U. Council is preparing for the congress to be held in Brisbane in October a report concerning the desirability of a second edition of the R.A.O.U. “Check-list.” It now seems possible that practical uniformity rendered so improbable, and yet so necessary, by the publication of the “Official Check-list of the Birds of Australia” and Mr. Mathews’ “Reference-list” (1912) and new list (1913), will be achieved at an early date. The new B.O.U. list opens the way to a complete agreement.

The classification adopted is that of Dr. Sharpe in the "Hand-list of Birds," and used by Mr. Mathews in his three lists, and in the R.A.O.U. "Official Check-list." The order of the families, however, is reversed in the B.O.U. list, which begins with the Crow family.

In nomenclature, the tenth edition of Linnæus's "Systema Naturæ" (1758) is recognized as the foundation instead of the twelfth edition (1766) which was previously used. This has caused many changes of names. To preserve some well-known names, though many have been changed, thirteen names (*nomina conservanda*) have been exempted from the operation of the law of priority. As so many changes were made, and so few exceptions were allowed, it almost seems a pity that thirteen more changes were not made at a time when changes were expected.

Trinomials are used for all races (sub-species) except the typical race. This is a departure from the practice of the A.O.U. "Check-list," Mathews' 1913 list of Australian birds, and "A Hand-list of British Birds," by Hartert and others. Apparently the reason for this is to avoid the repetition, which is said by some to be cumbersome. But is *Coccothraustes coccothraustes coccothraustes* more cumbersome than *Nucifraga caryocatactes macrorhynchus*, the second trinomial in the book, especially when the former is written in the usual form, *C. c. coccothraustes*? Again, is *Acanthis linaria linaria* (*Acanthis l. linaria*) more cumbersome than *Acanthis linaria holboelli*? At least, the tautonymous name is more easily remembered and written. Further, a scientific worker on anatomy, plumage phases, &c., is debarred, under the B.O.U. practice of using trinomials, from referring to a species which has been divided into races. He can refer to an order, a sub-order, a family, a sub-family, a genus, and a sub-species, but not to a species. That may easily be a disadvantage. Again, the use of the binomial for a sub-species causes confusion. *Acanthis linaria* refers only to the typical race, while, apparently, *Fringilla montifringilla*, on the previous page, refers to a species—one cannot say from the B.O.U. list, for there may be races of the latter not recorded from Britain. Nomenclature is not an end, but a means to further study. This change in a custom of nomenclature will apparently not assist further study.

The same objection to tautonymous names was made previously. They were not used in the first edition. That refusal is responsible for many of the changes in the second edition, where *Carduelis carduelis*, *Pica pica*, and many other repetitions, have to be used, even though they may appear clumsy and cumbersome. Scientific ornithology is not concerned with what is easy, cumbersome, or inappropriate, but with exact uniformity of name, and that seems possible only by a strict adherence to the International Code.

"One-letterism" is responsible for some small inconsistency in an otherwise well-executed piece of work. *Tyto* is disallowed because of a prior *Tyta*, but *Galerida*, though stated to be a

mistake for *Galerita*, is not invalidated by a prior use of *Galerita* for a beetle. If *Galerita* does not invalidate *Galerida*, why should *Apos* (a crustacean) invalidate *Apus* (a Swift), especially when the name of the bee, *Apis* (Linnaeus, 1735) did not invalidate it or *Aphis* (Linnaeus, 1748), (the rose blight). *Ulex* (gorse) and *Ilex* (holly) are well-known plant names that apparently are not confused. One-letterism threatens to cause serious yet needless trouble, especially when it is stretched until it is claimed that *Meliphaga* is invalidated by a prior *Melophagus*. Are ornithologists so much more liable to mistake and confusion than entomologists and botanists, who use *Apis* and *Aphis* and *Ulex* and *Ilex* respectively? Surely not! If the B.O.U. reasons are sound, should not a prior use of *Acrobates* (1817) for an Australian marsupial invalidate *Agrobates* (1836), the name used for the Rufous and Grey-backed Warblers in the new B.O.U. lists?

"No attempt at synonymy has been made. . . . The only references given are to the first edition of the list, to the second edition of Howard Saunders's well-known 'Manual of British Birds,' and to the 'Catalogue of the Birds in the British Museum.' In cases where additions have been made to the British list since 1899, when Saunders's 'Manual' was published, a reference to the first definite British record is given."

The range of each bird, within and without the British Isles, is fully given. Lists of British birds are set out under seven heads as follows:—

1. Residents	..	..	..	..	141
2. Summer Visitors	..	..	..	..	47
3. Winter Visitors	..	..	..	..	46
4. Birds of Passage	..	..	..	..	30
5. Occasional Visitors	..	..	..	..	61
6. Rare Visitors	..	..	..	..	149
7. Extinct	..	..	..	..	1
					—
Total	..	..	..	..	475

The new B.O.U. list has been welcomed by British and American ornithologists as a "notable advance" towards uniformity. Their Australian *confrères* join in the welcome, and hope soon to secure for Australian ornithology the advantages of that advance.

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## The New B.O.U. List and Australian Bird Names.

To assist members to appreciate the importance and value of the new B.O.U. List of British Birds, the species and genera common to British and Australian lists are printed with their names according to the B.O.U. list, the R.A.O.U. "Check-list," and Mr. Mathews' 1913 list amended in the *Austral Avian Record*.

GENERA OF THE R.A.O.U. CHECK-LIST INCLUDED IN THE NEW B.O.U.  
LIST.

R.A.O.U.:	B.O.U.	Mathews' 1913 List and A.A.R.
1.— 8.† <i>Coturnix</i>	.. Do.* ..	.. <i>Maroturnia</i>
2.— 11. <i>Turnix</i> ..	.. Do. ..	.. Do.
3.— 24. <i>Columba</i>	.. Do. ..	.. <i>Leucomelæna</i>
4.— 41. <i>Hypotænidia</i>	.. <i>Rallus</i> ..	.. Do.
5.— 45. <i>Crex</i> ..	.. Do. ..	.. Do.
6.— 46. <i>Porzana</i>	.. Do. ..	.. Do.
7.— 53. <i>Gallinula</i>	.. Do. ..	.. Do.
8.— 54. <i>Porphyrio</i>	.. Do. ..	.. Do.
9.— 56. <i>Fulica</i> ..	.. Do. ..	.. Do.
10.— 57. <i>Podiceps</i>	.. Do. ..	.. Do.
11.— 63. <i>Oceanites</i>	.. Do. ..	.. Do.
12.— 65. <i>Pelagodroma</i>	.. Do. ..	.. Do.
13.— 68. <i>Puffinus</i>	.. Do. ..	.. <i>Alphapuffinus</i>
14.— 76. <i>Priocella</i>	.. <i>Fulmarus</i>	.. <i>Priocella</i>
15.— 79. <i>Æstrelata</i>	.. Do. ..	.. <i>Æstrelata</i>
16.— 86. <i>Daption</i>	.. Do. ..	.. <i>Petrella</i>
17.— 95. <i>Diomedea</i>	.. Do. ..	.. Do.
18.—101. <i>Hydrochelidon</i>	.. Do. ..	.. Do.
19.—103. <i>Gelochelidon</i>	.. <i>Sterna</i> ..	.. <i>Gelochelidon</i>
20.—104. <i>Sylochelidon</i>	.. † „ ..	.. <i>Hydroprogne</i>
21.—105. <i>Sterna</i> ..	.. „ ..	.. Do.
22.—111. <i>Onychoprion</i>	.. „ ..	.. <i>Thalasseus</i>
23.—115. <i>Anous</i> ..	.. Do. ..	.. Do.
24.—119. <i>Larus</i> ..	.. Do. ..	.. <i>Bruchigavia</i>
25.—121. <i>Megalestris</i>	.. <i>Catharacta</i>	.. Do.
26.—123. <i>Stercorarius</i>	.. Do. ..	.. Do.
27.—124. <i>Strepsilas (Arenaria)</i>	.. <i>Arenaria</i>	.. Do.
28.—125. <i>Hæmatopus</i>	.. Do. ..	.. Do.
29.—131. <i>Squatarola</i>	.. Do. ..	.. Do.
30.—132. <i>Charadrius</i>	.. Do. ..	.. <i>Pluvialis</i>
31.—137. <i>Ægialitis</i>	.. Do. ..	.. <i>Charadrius</i>
32.—141. <i>Eudromias</i>	.. Do. ..	.. <i>Peltohyas</i>
33.—142. <i>Himantopus</i>	.. Do. ..	.. Do.
34.—144. <i>Recurvirostra</i>	.. Do. ..	.. Do.
35.—145. <i>Numenius</i>	.. Do. ..	.. Do.
36.—148. <i>Limosa</i> ..	.. Do. ..	.. Do.
37.—150. <i>Totanus</i> ..	.. <i>Totanus</i>	.. <i>Iliornis</i>
38.—153. <i>Actitis</i> ..	.. † „ ..	.. <i>Actitis</i>
39.—155. <i>Glottis</i> ..	.. „ ..	.. Do.
40.—156. <i>Rhyacophilus</i>	.. „ ..	.. Do.
41.—154. <i>Terekia</i> ..	.. Do. ..	.. Do.
42.—157. <i>Bartramia</i>	.. Do. ..	.. Do.
43.—158. <i>Calidris</i> ..	.. Do. ..	.. Do.
44.—159. <i>Limicola</i>	.. Do. ..	.. Do.
45.—160. <i>Pisobia</i> ..	.. <i>Tringa</i>	.. <i>Pisobia</i>
46.—163. <i>Ancylochilus</i>	.. † „ ..	.. <i>Erolia</i>
47.—164. <i>Tringa</i> ..	.. „ ..	.. <i>Canutus</i>

\* "Do." signifies the same name as in the column to the left.

† 8 signifies number of species in R.A.O.U. "Official Check-list."

‡ „ signifies same name as above it.

R.A.O.U.	B.O.U.	Mathews' 1913 List and A.A.R.
48.—160. <i>Gallinago</i> ..	Do.* ..	<i>Subspilura</i>
49.—160. <i>Glareola</i> ..	Do. ..	Do.
50.—171. <i>Edicnemus</i> ..	Do. ..	<i>Burhinus</i>
51.—177. <i>Plegadis</i> ..	Do. ..	Do.
52.—178. <i>Platalea</i> ..	Do. ..	<i>Spatherodia</i>
53.—182. <i>Ardea</i> ..	Do. ..	Do.
54.—184. <i>Herodias</i> ..	<i>Egretta</i> ..	<i>Casmerodius</i>
55.—180. <i>Garzetta</i> ..	Do. ..	<i>Egretta</i>
56.—191. <i>Nycticorax</i> ..	Do. ..	Do.
57.—192. <i>Butorides</i> ..	Do. ..	Do.
58.—194. <i>Ardetta</i> ..	<i>Ixobrychus</i> ..	Do.
59.—197. <i>Botaurus</i> ..	Do. ..	Do.
60.—206. <i>Tadorna</i> ..	<i>Tadorna</i> ..	<i>Radjah</i>
61.—207. <i>Casarca</i> ..	† ..	<i>Casarca</i>
62.—208. <i>Anas</i> ..	Do. ..	Do.
63.—211. <i>Querquedula</i> ..	Do. ..	Do.
64.—212. <i>Spatula</i> ..	Do. ..	Do.
65.—216. <i>Nyroca</i> ..	Do. ..	Do.
66.—219. <i>Phalacrocorax</i> ..	Do. ..	Do.
67.—224. <i>Plotus</i> ..	<i>Anhinga</i> ..	Do.
68.—225. <i>Sula</i> ..	Do. ..	Do.
69.—231. <i>Phaethon</i> ..	Do. ..	<i>Scæophaethon</i>
70.—233. <i>Pelecanus</i> ..	Do. ..	<i>Catoptropelicanus</i>
71.—234. <i>Circus</i> ..	Do. ..	Do.
72.—236. <i>Astur</i> ..	Do. ..	Do.
73.—240. <i>Accipiter</i> ..	Do. ..	Do.
74.—246. <i>Haliaeetus</i> ..	Do. ..	<i>Cuncuma</i>
75.—249. <i>Milvus</i> ..	Do. ..	Do.
76.—252. <i>Elanus</i> ..	Do. ..	Do.
77.—255. <i>Falco</i> ..	Do. ..	Do.
78.—261. <i>Cerchneis</i> ..	Do. ..	Do.
79.—262. <i>Pandion</i> ..	Do. ..	Do.
80.—270. <i>Strix</i> ..	<i>Flammea</i> ..	<i>Tyto</i>
81.—352. <i>Merops</i> ..	Do. ..	<i>Cosmerops</i>
82.—355. <i>Caprimulgus</i> ..	Do. ..	Do.
83.—358. <i>Chætura</i> ..	Do. ..	Do.
84.—359. <i>Cypselus</i> ..	<i>Micropus</i> ..	Do.
85.—360. <i>Cuculus</i> ..	Do. ..	Do.
86.—382. <i>Hirundo</i> ..	Do. ..	Do.
87.—404. <i>Acrocephalus</i> ..	Do. ..	<i>Conopoderas</i>
88.—680. <i>Motacilla</i> ..	Do. ..	<i>Budytes</i>
89.—681. <i>Anthus</i> ..	Do. ..	<i>Austranthus</i>
90.—712. <i>Oriolus</i> ..	Do. ..	<i>Mimeta</i>
91.—732. <i>Corvus</i> ..	Do. ..	Do.

\* "Do." signifies the same name as in the column to the left.

† .. signifies same name as above it.

## SPECIES COMMON TO BRITISH AND AUSTRALIAN LISTS.

R.A.O.U. Check-list.	B.O.U. List.	Mathews' 1913 List and A.A.R.
1.—45. <i>Crex crex</i>	.. Do.* ..	.. Do.
2.—57. <i>Podiceps gularis</i>	.. <i>P. fluviatilis</i>	.. <i>Tachybaptus ruficollis</i>
3.—59. <i>P. australis</i>	.. <i>P. cristatus</i>	.. Do.
4.—63. <i>Oceanites oceanica</i>	.. <i>O. oceanicus</i>	.. Do.
5.—65. <i>Pelagodroma marina</i>	Do. ..	.. Do.
6.—70. <i>Puffinus assimilis</i>	.. <i>P. obscurus</i>	.. <i>P. assimilis</i>
7.—72. <i>P. griseus</i>	.. Do. ..	.. <i>Neonectris griseus</i>
8.—76. <i>Priocella glacialis</i>	<i>Fulmarus glacialis</i>	<i>Priocella antarctica</i>
9.—86. <i>Daption capensis</i>	.. <i>D. capense</i>	.. <i>Petrella capense</i>
10.—95. <i>Diomedea melanophrys</i>	Do. ..	.. <i>Thalassarche melanophrys</i>
11.—101. <i>Hydrochelidon leucoptera</i>	Do. ..	.. Do.
12.—102. <i>H. fluviatilis</i>	.. <i>H. leucopareia</i>	.. Do.
13.—103. <i>Gelochelidon macro-tarsa</i>	<i>Sterna anglica</i>	.. <i>Gelochelidon nitotica</i>
14.—104. <i>Sylochelidon caspia</i>	<i>Sterna caspia</i>	.. <i>Hydroprogne tschegrava</i>
15.—105. <i>Sterna gracilis</i>	.. <i>S. dougalli</i>	.. Do.
16.—107. <i>S. cristata</i>	.. <i>S. bergii</i>	.. <i>Thalasseus bergii</i>
17.—110. <i>Onychoprion anæ-theta</i>	<i>S. anæthetus</i>	.. <i>Melanosterna anæthetus</i>
18.—111. <i>O. fuliginosa</i>	.. <i>S. fuliginosa</i>	.. <i>Onychoprion fuscatus</i>
19.—115. <i>Anous stolidus</i>	.. Do. ..	.. Do.
20.—122. <i>Stercorarius pomatorhinus</i>	<i>S. pomarinus</i>	.. —
21.—123. <i>S. crepidatus</i>	.. <i>S. parasiticus</i>	.. Do.
22.—124. <i>Strepsilas (Arenaria) interpres</i>	<i>A. interpres</i>	.. Do.
23.—125. <i>Hæmatopus longirostris</i>	<i>H. ostragelus</i>	.. Do.
24.—131. <i>Squatarola helvetica</i>	<i>S. squatarola</i>	.. Do.
25.—132. <i>Charadrius fulvus</i>	.. <i>C. dominicus fulvus</i>	<i>Pluvialis dominicus fulvus</i>
26.—137. <i>Ægialitis hiaticula</i>	.. Do. ..	.. <i>Charadrius hiaticula</i>
27.—145. <i>Numenius cyanopus</i>	<i>N. arquata</i> (?)	.. <i>N. cyanopus</i>
28.—146. <i>N. uropygialis</i>	.. <i>N. phaeopus</i>	.. <i>Phaeopus phaeopus</i>
29.—148. <i>Limosa uropygialis</i>	<i>L. lapponica</i>	.. <i>Vetola lapponica</i>
30.—149. <i>L. melanuroides</i>	.. <i>L. limosa</i>	.. <i>L. l. melanuroides</i>
31.—150. <i>Totanus stagnatilis</i>	Do. ..	.. <i>Iliornis stagnatilis</i>
32.—151. <i>Totanus ochropus</i>	.. Do. ..	.. <i>Tringa ochropus</i>
33.—153. <i>Actitis hypoleucis</i>	.. <i>Totanus hypoleucis</i>	<i>Actitis hypoleucis</i>
34.—154. <i>Terekia cinerea</i>	.. Do. ..	.. Do.
35.—155. <i>Glottis nebularius</i>	.. <i>Totanus nebularius</i>	<i>Glottis nebularius</i>
36.—156. <i>Rhyacophilus glareola</i>	<i>Totanus glareola</i>	<i>Rhyacophilus glareola</i>
37.—157. <i>Bartramia longicauda</i>	Do. ..	.. Do.

\* "Do." signifies the same name as in the column to the left.

R.A.O.U. Check-list.	B.O.U. List.	Mathews' 1913 List and A.A.R.
38.—158. <i>Calidris arenaria</i> ..	Do.* ..	<i>C. leucophæa</i>
39.—159. <i>Limicola sibirica</i> ..	<i>L. falcinellus sibirica</i>	Do.
40.—160. <i>Pisobia ruficollis</i> ..	<i>Tringa minuta ruficollis</i>	<i>P. m. ruficollis</i>
41.—162. <i>Pisobia acuminata</i> ..	<i>Tringa acuminata</i>	<i>Limnocinclus acuminatus</i>
42.—163. <i>Ancylorchilus arquatus</i> sub-	<i>Tringa ferruginea</i>	<i>Erolia ferruginea</i>
43.—164. <i>Tringa canutus</i> ..	Do. ..	<i>Canutus canutus</i>
44.—177. <i>Plegadis falcinellus</i> ..	Do. ..	Do.
45.—182. <i>Ardea cinerea</i> ..	Do. ..	Do.
46.—184. <i>Herodias syrmatophorus (timoriensis)</i>	<i>Egretta alba timoriensis</i>	<i>H. alba syrmatophora</i>
47.—180. <i>Garzetta immaculata</i>	<i>Egretta garzetta nigripes</i>	<i>E. g. immaculata</i>
48.—194. <i>Ardetta pusilla</i> ..	<i>Ixobrychus minutus</i>	Do.
49.—211. <i>Querquedula querquedula</i>	Do. ..	Do.
50.—212. <i>Spatula clypeata</i> ..	Do. ..	Do.
51.—219. <i>Phalacrocorax carbo</i>	Do. ..	Do.
52.—255. <i>Falco melanogenys</i> ..	<i>F. peregrinus</i>	<i>Rhynchodon peregrinus</i>
53.—262. <i>Pandion leucocephalus</i>	<i>P. haliaëtus</i>	Do.
54.—270. <i>Strix delicatula</i> ..	<i>Flammea flammea</i>	<i>Tyto alba</i>
55.—358. <i>Chactura caudacuta</i>	Do. ..	Do.
56.—686. <i>Motacilla similima</i>	<i>M. flava</i>	<i>Budytes flava</i>

\* "Do." signifies the same name as in the column to the left.

## Correspondence.

To the Editors of "The Emu."

SIRS,—After perusing Mr. Gregory M. Mathews' "A List of the Birds of Australia," one cannot but be struck with the lack of knowledge regarding the geographical distribution of many of our species. I append a list of some of the birds with whose habitat I am most conversant, together with a few corrections or omissions that are noticeable. Perhaps other Australians will help in this direction.

Page 9.—*Turnix maculosa melanota*. Include Victoria (Northern).

Page 18.—*Phaps chalcoptera chalcoptera*. Include Tasmania.

Page 91.—*Nethion gibberifrons* is omitted, and this species must be listed. Perhaps Dr. W. Macgillivray would give some information about this bird.

Page 102.—*Circus assimilis assimilis*. Include Tasmania.

Page 102.—*Circus approximans approximans*. Include Tasmania.

Page 104.—*Accipiter c. cirrocephalus*. Include Tasmania.

Page 105.—*Uroaetus a. audax*. Include Tasmania.

Page 114.—*Spiloglaux boobook maculata*. Include south-east Victoria.

Page 115.—*Hieracoglaux c. connivens*. Include Victoria (general).

- Page 117.—*Tyto longimembris walleri*. Include Victoria.  
 Page 141.—*Geopsittacus occidentalis*. Include north-west Victoria.  
 Page 149.—*Cyanalcyon p. pyrrhopygus*. Include northern Victoria.  
 Page 157.—*Neochalcites basalis mellori*. Include Tasmania.  
 Page 165.—*Lagenoplastes a. ariel*. Include Tasmania.  
 Page 170.—*Smicrornis b. brevirostris*. Include Victoria (Ringwood).  
 Page 172.—*Gerygone o. olivacea*. Include Victoria (Wangaratta).  
 Page 192.—*Monarcha m. melanops*. Include Eastern Victoria.  
 Page 209.—*Conopodera a. australis*. Include Tasmania.  
 Page 220.—*Neoseericornis l. lathamii*. Include eastern Victoria.  
 Page 226.—*Leggeornis lamberti assimilis*. Include north-west Victoria.  
 Page 251.—*Climacteris erythroops superciliosa*. Include western New South Wales and north-west Victoria.  
 Page 268.—Add *Grantiella picta borealis*, Northern Territory.  
 Page 286.—*Myzantha f. flavigula* is found associated with *M. f. melanotis*, north-west Victoria.  
 Page 292.—*Tropidorhynchus c. corniculatus*. Add Victoria (Fern-tree Gully).  
 Page 301.—*Aidemosyne modesta*. Add Victoria.  
 Page 310.—*Chlamydera m. maculata*. Add north-west Victoria.  
 Page 314.—*Corvus bennetti bennetti*. Add north-west Victoria.

Lately, in *The Emu*, opinions regarding the collector have been expressed. Some members of the R.A.O.U. would not have a nest, egg, or bird touched, and if this conservatism should spread our scientific knowledge of geographical and economic ornithology must be limited. Of course, one cannot condone indiscriminate collecting, but surely (even if it is with us) it could be regulated.

It is likely that a second edition of the "Official Check-List" will be published, and, if so, it is to be hoped that it will be drawn up by a committee representative of Australian ornithologists, embracing both scientific cabinet workers and workers in the field. One cannot do without the other. Such a committee, I think, would have a good chance of presenting a perfect list to the people for whom it intends to cater.

FRANK E. HOWE.

Canterbury (Vic.), 16/5/15.

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To the Editors of "The Emu."

SIRS,—I think that the ornithologists of Victoria should seriously consider the advisability of using their influence with the Education Department to induce it to alter the date of "Bird Day." When birds are engaged in nesting and their nests contain eggs or fledglings we are instrumental in causing their haunts to be invaded throughout the State by thousands of impetuous children, who, though their intentions are good, cause incalculable harm, and I venture to say that of the hundreds of nests discovered and examined on "Bird Day" very few would be occupied a week later.

My own experience is that boughs are often broken by the scholars, the nests sometimes pulled about, and the eggs frequently cracked, and there is occasionally one in a school who has no scruples in returning later and removing eggs from nests. It needs an expert to examine a nest containing either eggs or young in such a way that the owners will not desert it, and we read of pincers and spoons being used in the operation.

Surely a date as far removed as possible from nesting season would be far more appropriate for "Bird Day" than the date now observed.

Holbrook, Poowong (Vic.), 13/5/15.

L. C. COOK.

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DESTRUCTION OF BIRDS BY WILD CATS.

*To the Editors of "The Emu."*

SIRS,—Mr. A. J. Campbell expresses the opinion that cats are primarily responsible for the disappearance of certain species of birds.\* While I am unable to offer an opinion as to the cause of the disappearance of the birds named by him, I can heartily support his suggestion that a committee be appointed to report on the question of bird destruction by wild domestic cats.

The toll taken by the pea-rifle, the grain cart, and the alleged sportsman is undoubtedly heavy, but, in my opinion, wild and tame domestic cats claim a far greater number of the more valuable insectivorous birds. Unfortunately, wild domestic cats have established themselves in many unsettled or thinly settled parts of the Commonwealth, where, formerly, birds were molested only by their indigenous enemies, or, perhaps, rarely, by a visiting naturalist.

In 1909-1910, while collecting in the far north-west of Kimberley, I was surprised to find cats on the mainland and adjacent islands, where they had been liberated, no doubt, from passing or visiting trepang and pearling craft. During a more recent expedition across the continent, I frequently saw these animals between Oodnadatta and Alice Springs and through the western Macdonnell Ranges. They were seen again in the Macarthur and Roper River country, across to the Katherine, and northwards to the coast. There are obvious and practically insuperable difficulties in dealing with this pest in the great areas referred to, but in the more settled States the economic value of our fast-diminishing bird-life should justify drastic action, or, at least, serious consideration of a subject which, as Mr. Campbell remarks, will have to be faced sooner or later.

Few will dispute the fact that cats do a certain amount of good by destroying rabbits and other vermin, which are more effectually checked by artificial means, but it is very much open to doubt

\* *Emu*, vol. xiv., part 3.

whether the good they do in this direction is commensurate with the loss sustained by the destruction of our birds.

GERALD F. HILL.

Darwin, Northern Territory, 11th Feb., 1915.

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### Bird Observers' Club.

THE monthly meeting of the Bird Observers' Club was held at the Olderfleet Tea Rooms, Melbourne, on 21st April, 1915. Mr. D. Le Souëf, president, occupied the chair. Mr. K. M'Veiken was the host. Mr. F. E. Wilson read a report of the sub-committee appointed to deal with the question of "ringing" birds. An interesting letter from Dr. H. W. Bryant, describing his experiences on a visit to the Cairo Zoo, was read. Several members mentioned the extraordinary movements of birds owing to the drought conditions. Many birds, it was stated, found it difficult to find food on account of the scarcity of insect life. The president read a copy of the measure that had been passed in the United States of America prohibiting the importation of all plumes except those of domestic poultry and Ostriches. The president showed a copy of the new list of British birds, compiled by a committee of the B.O.U.

Mr. D. Le Souëf, C.M.Z.S., retiring president, occupied the chair at the annual meeting of the Club, held on 26th May, at The Olderfleet Tea Rooms, Melbourne. The annual report stated that many valuable papers had been read at the meetings, while numbers of lantern slides were shown and interesting specimens exhibited. Attention had been given to bird protection and other important matters. Six members, who were serving the Empire, had been given extended leave of absence. The balance-sheet showed the financial position was very satisfactory. The following office-bearers were elected:—President, Mr. Charles Barrett; hon. secretary, Mr. George Finlay; hon. treasurer, Mr. G. Dyer.

Mr. Barrett, in sketching the history of the Club, said that it was born on 12th April, 1905, when a number of enthusiastic bird-lovers met at his residence, Were-street, Brighton Beach. Those present were Messrs. A. J. Campbell (who presided), F. E. Howe, A. H. E. Mattingley, D. Le Souëf, J. A. Kershaw, C. F. Belcher, A. G. Campbell, Fred. Godfrey, R. P. Godfrey, C. P. Kinane, and C. Barrett. Several others had been invited, but were unable to attend. After a full and free discussion, the meeting decided that a Bird Observers' Club should be formed, number of members to be limited to 25. All the founders of the Club were still living, but some had, for different reasons, ceased to be members. Before the Club was formed "bird men" in Melbourne were wont to meet occasionally at each other's homes, to chat over field observations and exhibit and exchange specimens; many delightful bush rambles were also made in company. The idea of the Club must have been floating in several minds before steps were taken to give it practical shape. The Club had had some vicissitudes, but it had never languished, and to-day it was more firmly established than ever.

Mr. Le Souëf gave a most interesting lecture on "Birds' Nests and Eggs," illustrated by a fine series of lantern slides from photographs taken in many parts of Australia.

### R.A.O.U. Council Meetings.

At the meeting of the Council of the Royal Australasian Ornithologists' Union on 7th May, at the rooms of Col. Chas. Ryan, Collins-street, Melbourne, Mr. A. H. E. Mattingley presided. Other members present were Messrs. Z. Gray, A. C. Stone, D. Le Souëf, L. G. Chandler, Chas. Barrett, and G. Finlay. Mr. Le Souëf read the report of the sub-committee appointed to consider the question of preparing a second edition of the "Official Check-list of the Birds of Australia," and it was decided that the recommendations made be published in *The Emu*. It was resolved that brief reports of proceedings at the Council meetings should be published in *The Emu* in future.

At the meeting of the Council held on 11th June, Mr. D. Le Souëf presiding, arrangements for the annual session at Brisbane in October, and the working camp-out farther north, were considered. A sub-committee was appointed to deal with camp rules and so forth. Mr. Charles Barrett urged that some restriction should be placed on collecting at the Union's camps-out. Specimens of birds and eggs were necessary for public museums, and a limited number was required by ornithologists who were doing scientific work, but general collecting should be discouraged. Mr. A. C. Stone defended the policy of collecting. In view of the fact that a large number of type specimens of birds was not in Australia, it was necessary that further specimens should be secured, so that the Check-list Committee, when it began work on a second edition of the list, might not be hampered. But for the collector, little would be known of our birds. Messrs. A. J. Campbell, D. Le Souëf, A. H. E. Mattingley, and others spoke on the subject. It was reported that the sub-committee appointed to deal with the ring-marking of migratory birds was making satisfactory progress with preliminary work, and the scheme would be in full swing shortly.

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### From Bush to Museum.

MR. J. A. Kershaw, F.E.S., Curator of the National Museum, Melbourne, describing his experiences in Northern Queensland, in *The Victorian Naturalist*, April, 1915, gives some pleasant glimpses of bird life. A good specimen of a bower was obtained.

"Close to our camp was discovered an old and deserted bower of the Fawn-breasted Bower-Bird (*Chlamydera cerviniventris*), and on the following day a fresh one was found, built in the shelter of some thick scrub. The sides of the bower were formed of small twigs, closely and securely packed, about 15 inches long and 12 inches high, separated at the top, the base, of similar material, extending at either end a little distance from the upright sides. Both entrances were decorated with numbers of brightly-coloured berries about half an inch long, some bright green, others dark blue, while others were placed here and there among the tops of the upright twigs forming the sides of the bower. A couple of feet from either entrance was a small heap of the faded and discarded berries. This bower was carefully removed, intact, and is now in the Melbourne Museum."

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Plate I. was engraved by Patterson, Shugg and Co. Pty. Ltd., Melbourne and Sydney, and printed by D. W. Paterson Co. Pty. Ltd., Melbourne.

## Annual Session, R.A.O.U.

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THE fifteenth annual session of the Royal Australasian Ornithologists' Union will be held at Brisbane on the 12th and 13th October, 1915, and will be followed by a working camp-out.

### PROGRAMME.

#### TUESDAY, 12th OCTOBER—

MORNING: General Business.

AFTERNOON: Presidential Address.

EVENING: Public Lecture—"Australian Ornithology," by  
Dr. J. A. Leach, Col. Mem. B.O.U.  
"Island Bird-Life," by Mr. D. Le Souëf, C.M.Z.S.

#### WEDNESDAY, 13th OCTOBER—

MORNING: Election of Office-Bearers, &c.

AFTERNOON: Visit to Natural History Museum.

EVENING: Leave for Whitsunday Passage, *via* Gladstone, for  
the Camp-out.

This programme may be subject to alterations, owing to local conditions.

Dates of departure for Brisbane are :—Adelaide, 8th October; Melbourne, 9th October; Sydney, 10th October.

### CAMP-OUT.

It is proposed to form two camps—one on the mainland, where native fauna is abundant, and a crocodile may occasionally be seen; and another on one of the outside islands in Whitsunday Passage, where coal reefs may be examined, and sea birds studied in their rookeries. The camps will extend over about ten days.

Members who intend taking part in the camp-out are asked to communicate with the hon. secretary as soon as possible.





MACGILLIVRAYORNIS CLAUDI.

# The Emu

Official Organ of the Royal Australasian Ornithologists' Union.

"Birds of a feather."

VOL. XV.]

1ST OCTOBER, 1915.

[PART 2.

## A New Honey-eater : *Macgillivrayornis claudi*.

BY (DR.) W. MACGILLIVRAY, R.A.O.U., BROKEN HILL (N.S.W.)

### *Macgillivrayornis claudi*.

A small Passerine bird of the Honey-eater family. So far it is known to inhabit only the tropical scrubs bordering the Claudie River, which empties itself into Lloyd's Bay, on the eastern side of the Cape York Peninsula. This bird was first described by Mr. G. M. Mathews in the *South Australian Ornithologist*, April, 1914, from a specimen obtained by Mr. W. M'Lennan and myself on the 10th November, 1913.

The generic characters are :—Bill equal to the head in length. First primary half the length of the second, which is two-thirds the length of the third ; fourth, fifth, and sixth primaries are equal and longest.

Specific characters :—General colour above, including the wing coverts, greenish ; primaries brown, edged with green ; tail blackish-brown ; throat grey ; remainder of the under surface yellow ; under wing coverts lighter yellow ; narrow ring of feathers round the eye white.

Measurements, taken in the flesh, of type specimen :—Length, 116 mm. ; wing, 55 mm. ; culmen, 14 mm. ; tarsus, 18 mm. ; middle toe and claw, 12 mm.

The sexes are alike in colouring.

Only found in the dense scrub ; usually seen threading its way among the leaves and twigs high up under the canopy of tropical vegetation, where its small size and protective colouring render it a very inconspicuous object. The honour of discovering this bird belongs to Mr. M'Lennan, whose ear, keenly attuned to every bird-note in the scrub, detected an unfamiliar one from among the medley of bird-calls and other noises on the day after my arrival at his camp on the Claudie. We had been down the river in the dingey to bring up a load of our baggage, left on the previous day, and landed at a patch of scrub, in order to replenish our larder with a few Torres Strait Pigeons. After threading our way through the scrub, finding a nest and eggs of the Rifle-Bird, Mr. M'Lennan heard and detected this species, and soon had two specimens in his hands.

The birds are not plentiful, though we afterwards obtained several specimens.

Dissection proved that these birds feed mostly upon small insects, and the state of the sexual organs seemed to indicate that the nesting season is in the summer months, after the beginning of the wet season. Nothing, however, is yet known of the nidification of the species.

## Notes on the Yellow-bellied Shrike-Tit, *Falcunculus frontatus*.

By A. H. CHISHOLM, R.A.O.U., MARYBOROUGH, VIC.

MANY years ago the Yellow-bellied Shrike-Tit (*Falcunculus frontatus*) was probably as plentiful about the Maryborough (Vic.) district as Mr. A. J. Campbell reports it to have been adjacent to Melbourne. Its fearlessness, however, made the showy bird an easy target for thoughtless boys, and, accordingly, its numbers soon markedly decreased. When the persecution lessened the bird became noticeable again, and was casually known to us boys of a later generation as the "Yellow-hammer"—this by reason of its bark-hammering proclivities. But we knew nothing of its nest till, a little over ten years ago, Mr. Donald Macdonald wrote this passage in a Melbourne magazine:—

"The gem nest to which I refer is beautiful alike in structure and colour. I saw it for the first time last week, built in the frail, topmost bough of a gum-tree. It was the nest of the Crested Shrike, a bird conspicuous by its yellow breast and thick, strong bill. It builds generally in a gum sapling too frail to bear the weight of even the smallest boy, and that yellow nest, placed just out of reach, has tantalized many a collector, for it is the find of a lifetime. . . . At first glance you would assume that the outside of the nest was made entirely from pickings of a new hempen rope. The material is apparently fibre, for, even among the dried grass-blades of many colours round about, you can find nothing exactly like it. This is bound closely together outside, the general line of the material being up and down. Inside, much the same material is used, but it runs in threads round and round the structure, the whole making a warm and beautifully symmetrical nest."

"The find of a lifetime!" Was not that enough to further warm the enthusiasm of a bird-nesting boy? I looked at the Shrike-Tit with a new interest after that. Not till several years later, however, did I see the nest *in situ*. I observed a pair of the birds with a trio of fledgelings about a certain belt of timber in the spring of 1912, and in the following year gave that locality close attention. The Shrike-Tits are constant to a favourable locality, and, sure enough, the pair in question ceased their happy-go-lucky wanderings in August and came again about a fossicker's

camp they had been wont to patronize. For several days in the following month we tried to trace the male bird as he left the camp, but it always went in what was ultimately found to be the wrong direction. However, the bird did contribute to the locating of the nest by the utterance, while building, of a melancholy monotone, as characteristic as the sweet nesting-note of the Yellow-breasted Shrike-Robin (*Eopsaltria australis*). At times this note would be emitted just once, very softly, and again the



Nest and Eggs of Yellow-bellied Shrike-Tit.

FROM A PHOTO. BY A. H. CHISHOLM.

Tit would become more loquacious, and continuously express satisfaction with the world in general, and its mate in particular. Without this bar, the finding of the nest would have been doubly difficult, for the single, soft note is too ventriloquial to be easily located, and a little cluster at the top of a sapling 40 feet in height is rather much to look for in a forest.

It was on 24th September that, having traced it to a likely

tree, I watched the male till my neck became stiff, and was rewarded by seeing the female arrive, flash up to the topmost fringe of the bushes, and weave away at a small cluster that was assuming cup shape. What satisfaction it was to have found the much-desired nest at last! It was a privilege, too, to couch by while the Tits worked, and to be supplied with practical evidence against the insinuation that the male has either no ability or no inclination to assist in nest-building. The female is certainly the leading spirit in the enterprise, but the male does his part by bringing a share of the material, and at times, too, varies the practice of passing the fibres to the female by stitching them in himself. Probably only the more delicate worker attends to the weaving and binding of the web-like substance on the outside of the nest. Around the rim this is managed by the bird sitting in the nest that its breast is modelling, and drawing the bill gently upwards—a pretty practice that the Tit has in common with the Flycatchers and some other birds that build soft, open nests.

In noting these building arrangements I had not only this one pair of birds to rely on, for the experience gained in locating the first nest helped me to find several others, and by mid-November I had listed seven of these dainty dwellings. None was situated lower than 25 feet, and some few swayed at the tops of trees 50 feet in height. And when the wind blew, how the nests did rock!

Toward the end of that November the R.A.O.U. session in South Australia intervened, and when I returned most of my birds had left the nests. The collecting of a few of the deserted nests then gave the opportunity for examining the building material. This proved what I had suspected through repeatedly seeing the strong-billed birds hammering at the *green* bark of eucalypts—that the nests are constructed almost wholly of the yellowish, fibrous bark underlying the rougher exterior of the trees. This is beaten into very fine shreds and bound tightly with spiders' webs, filmy substance from cocoons, and, occasionally, lichen from the old "snake" fences. Of grass little is used—just a dozen or so fine bents to line the bottom of the nest. But the Shrike-Tits are not absolutely constant to this material. Shrewd workers in every way, the birds readily adapt themselves to a particular environment. Last spring (1914) a pair that built in a tall blue gum in a Maryborough public park constructed the walls of the nest of soft, pulpy wood, which the female dug from a dry limb of the tree. Inside the nest fine rushes from the lake-side were used.

Remembering that the lately-discovered *F. whitei* also builds a nest of fine bark-shreds,\* it would be surprising if the only other member of the genus (*F. leucogaster*, of Western Australia), created a departure by using nothing but "the very finest of dried grasses," as suggested by Mr. F. L. Whitlock.† The nest described by him

\* R.A.O.U. Bulletin No. 4. † *Emu*, vol. xi., p. 243.

may have been an exception, but it is easy to mistake the fine bark or pulpy wood for grasses if the birds are not seen obtaining the material. In regard to size, most of the dozen odd nests I have examined, though showing various little distinctions in outline, presented slight variations, and nearly agreed with those given by Mr. H. L. White in respect of the nest of the Yellow Shrike-Tit (*F. whitei*). They were all deep enough to give the sitting bird plenty of purchase—a very necessary thing on windy days. One nest in my possession has an inside depth of  $2\frac{1}{4}$  inches, with a width of  $1\frac{1}{2}$  inches. Naturally, only the tip of the tail and bill of the bird could be seen when she was brooding, and it was a puzzle how she reached the eggs at all. Mention of the swaying of the nest calls to mind the habit the Shrike-Tit has of nipping off leaves from above its nest. Why is this done? I have not heard or read any ornithologist's explanation, but members of a school-class to whom I showed a nest suggested that the object was to lessen the swaying of the slender branch—a logical assumption. When occasion warrants it, however, the leaves above the nest are left intact, and, if the branchlet be too fine, it is not stripped of its bark. (The absence of this leaf-clipping seems apparent in Mr. Whitlock's photograph of the nest of *F. leucogaster*.)

Altogether, the Shrike-Tit, in my opinion, is one of the most marvellous bird artists. With a bill heavier than that of any other Australian bird of its size, it builds a nest that is a model of symmetry and stability. Of the eggs—deep white, heavily flecked with lilac—I have not seen much, but broods in the Maryborough district have usually numbered three, sometimes two.

The average period from the start of the nest to the departure of the young I found to be about six weeks. Building operations are usually completed in little more than a week; incubation takes about 20 days; and the young grow to the flight stage in, roughly, three weeks. When this period is closing, signs of restlessness in the nest may be observed from below. The flapping of little wings shows that the chicks are eager to be abroad, and a shaking of the nesting-tree at once starts them. Then commotion reigns. With crests erect and tails spread wide, the parents flit anxiously about, rapidly uttering a harsh, chiding "Charr-charr," and now and again breaking into the piping whistle. Fired with a spirit of emulation, the young birds do their best to swell the medley, and chime in with a "Ta-ta-ta," "Choo-choo-choo." In colour they are, of course, more subdued than the parents, especially about the throat, where the only darkness is at the base of the feathers. The crest is developed early, and seems to afford its owner unlimited satisfaction.

As with the nest-building, so with the hatching—the female does the greater part of the work. One pair I observed, however, relieved each other at regular intervals during a hot spell. Each bird would hunt for food for a few minutes, and, while an adjacent Yellow-breasted Shrike-Robin presented all its gleanings to its

mate, the male Shrike-Tit would feed the young, then sit, gasping, with wings spread wide, to shield the brood from the rays of the November sun. It was in connection with this pair that a picture of photographic operations was taken. Though there was good bush all about the locality, the capricious birds chose a sapling close to a well-used main road, and there built at a height of 16 feet. This was an extraordinarily low site for them to select, and I fancied it must be a record until Miss Muriel Cheney, R.A.O.U., informed me that she found a nest in the Wangaratta (Vic.) district as low as 10 feet. Such a departure is surely remarkable, for the greatest factor in maintaining the security



Yellow-bellied Shrike-Tits, Fledgeling and Adult ♂.

FROM A PHOTO. BY A. H. CHISHOLM.

of the Shrike-Tit's nest is its inaccessibility. Little attempt is made at concealment or protective coloration; thus, when a lofty situation is not chosen, the nest is in danger from enemies. It is not surprising that the birds observed by Miss Cheney were three times robbed by a cat; the pair showed pluck (and, incidentally, a characteristic of the species) in clinging to the one place for so long.

Sixteen feet was low enough to render a photograph possible, and the "wireless station" (to quote a suspicious early-morning cyclist) was put into operation on three successive days at dawn. The birds were not at all shy; they came back to feed the three





Photographing Yellow-bellied Shrike-Tits.

chicks almost immediately the camera was in position. Decidedly, the opportunity for photographing the birds at home was magnificent, but wind and sun interfered on two occasions, and when we went for a third time—with the elements as favourable as one could wish—we found an empty nest and wailing parents. Earlier in the hunt for Shrike-Tits' nests I had endured with equanimity a fall from a tree-top, the breakage of a camera, and sundry other "incidentals," but this latest failure was a profound disappointment.

Speaking of episodes of a more or less tragic nature, it is a curious thing that, though Shrike-Tits customarily build in finely safe positions, they occasionally fail to bring forth a brood. What persuades the birds sometimes to desert a completed nest for days at a stretch it is hard to suggest, and it seems just as difficult to find a reason for some of their dwellings having a ragged hole torn in one side. I have found two nests so treated, and deserted. The only thief I ever saw at a Shrike-Tit's nest was a spiteful Honey-eater, which, when I was coming down after vainly endeavouring to peep into a tree-top home, flitted up and stole some of the soft material. Shrike-Tits are usually very suspicious when building, and, if they see an observer at a nest which has just been started, will desert it immediately. In the case where I knew this to happen there was, however, a suspicion that the female did not approve of the site chosen, for she became very dilatory about the work, and stayed away so long that the male became excited, and called in admonitory tones till his mate returned. On another occasion (22nd November, 1914) a female Shrike-Tit with nesting material in its beak saw me, and remained perfectly still for a long time. I tired first, and did not find the nest.

Whether more than one brood is reared I do not certainly know, but it would seem that an occasional pair goes further than the September-December period, and nests well into the new year. For instance, as late as mid-May, in 1914, a sober-coloured young Shrike-Tit was seen, adjacent to Maryborough, following a male parent about the trees, meanwhile tremulously fluttering its wings and calling most plaintively. It was seen again a few days later, in company with three brighter-coloured adults, looking after itself for the most part, but now and again trying to impose on the hard-working adults by uttering quavering notes and quivering its wings. Later, the same day, a soft Tit-like note led me to inspect a thin, 16-feet high sapling. There, to my astonishment, I found, not two, but five Shrike-Tits sleeping on the outermost fringes of the thin branchlets, and exposed to the rising moon. Four of the birds had the fluffy, creamy-yellow breasts of young, but the fifth was a handsome female—yellow breast and green throat. It was a novel sight to see these active, vivacious birds perched so reposefully—indeed, with so many young the find was a novel one altogether. It is hardly likely, I think, that the four young birds belonged to one brood; possibly they were outcasts from two pairs, and just taken in

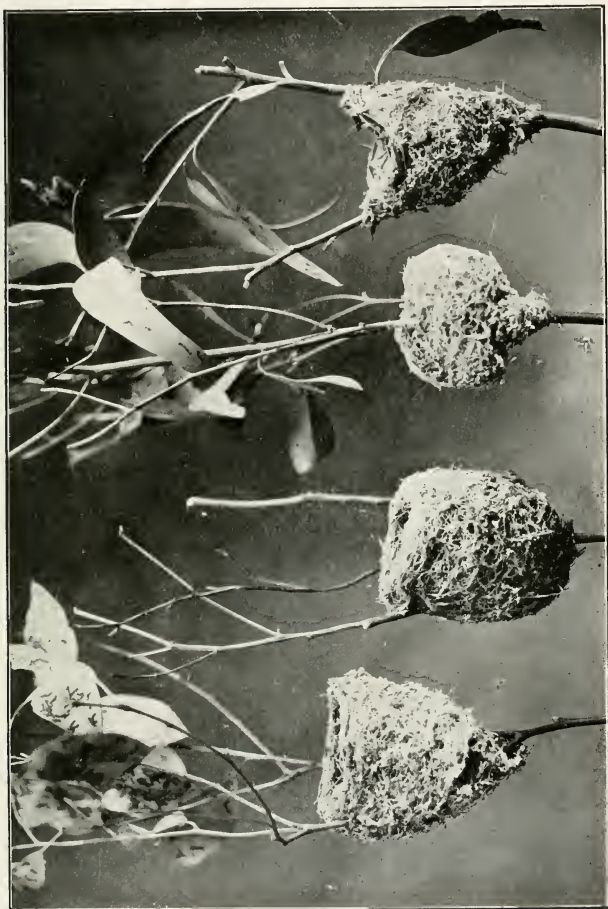
charge for the night by a casual adult female bird. I visited the locality many times in the hope of seeing the company again, but—though a large flock of Pied Grallinas (*Grallina picata*) regularly spent the night in the one clump of bushes near by—the Shrike-Tits did not return to the sapling where the quintette slept. A full month later, however, I was at the same spot (the fringes of the Maryborough reservoir) at dusk, and, watching a light-coloured Shrike-Tit, finally saw it settle down in the identical sapling that had been patronized by the five birds—right out on a tiny branchlet again. Sitting bunched up, with crest flat, it looked for all the world like a Yellow-breasted Shrike-Robin. The throat of this bird showed a dull green breaking through the creamy-yellow.

Respecting that quivering supplication used by the young Shrike-Tit, Mr. Whitlock, I notice, describes this as practised by the adult female of *F. leucogaster*. However, of the dozens of pairs of *F. frontatus* that I have watched in season and out, no female was seen to act thus. The female is not fed on the nest by the male. The last time I heard that quavering cry, and saw the Robin-like tremor of the wings, was in January, 1915, the actors being two lusty young Tits, one of which followed a male parent, while the other accompanied the female. Each of the fledgelings looked sturdy enough to fend for itself.

Of the utility of Shrike-Tits there can be only one opinion. Unquestionably they are among our most valuable birds. The quantity of insects they eat must be enormous, for no part of a tree—from hole to the uppermost leaves—is unvisited by them. Accordingly, they are acrobats of the first order, and, in displaying their resemblance to the true Tits of Europe, they assume some very graceful attitudes. By reason of its bark-hunting proclivities, the hammering and tearing sounds at once call attention to a Shrike-Tit's presence in a tree. These birds are sometimes locally known as Bark-Tits, but the name of "Yellow-hammer" will not easily be suppressed.

In the non-nesting months Shrike-Tits often visit the towns and do good service among the codlin moths in the orchards and various pests in the flower-gardens. In 1914 a pair was in the habit of visiting the Maryborough fire-station yard, and the keeper was entertained in watching two Sparrows dancing attendance on them as they foraged in some eucalypts. When the strong-billed native birds ripped off bark the Sparrows dashed in to share the feast revealed, and got away again quickly.

Occasionally, but not often, the Yellow-bellied Shrike-Tit works low down; more rarely it gets right on to the ground—which Mr. Whitlock remarks he has not known to be the case with *F. leucogaster*. On 28th June, 1914, I was watching a female, when its piping call brought up a handsome male. For some little time this bird was about the spot trying to emulate the work of the Babblers on the damp ground, but without success. The female remained among the tree-tops, and every now and again



Nests of the Yellow-bellied Shrike-Tit.

FROM A PHOTO. BY A. H. CHISHOLM.



made sure of its mate's presence by calling inquiringly. The male also used the piping whistle freely. It became excited when I gave a call, and, seeming to think a rival was in the field, came down at once, with crest elevated, piping close to me. It is a powerful, swelling note that the little throat emits, though the bill does not open at all widely. Following the piping came a polyglot chatter in the soothing undertone a human mother might adopt to a restless infant. Something of this confidential "croodle" is, I believe, possessed by many other birds, and little is known of it.

The manner in which the Shrike-Tits treat an imitation of their simple monotone gives further evidence of their capricious nature. A bird on the nest will usually peer inquiringly over the rim when it hears the call, and nearly always a solitary female will respond thereto. One I whistled to in early spring followed me excitedly for half a mile. On many other occasions, however, the same whistle has been treated by individual birds of both sexes with disdain. While this monotone is the most characteristic note in the Shrike-Tit's repertoire, it is by no means the most attractive. A number of undertones are given forth at intervals. Possibly it is a mimic, but I rather think that the notes are the natural chatter.

Finally, it may be well briefly to refer to the *F. flavigulus* of Gould. A few years ago Mr. G. M. Mathews issued an invitation\* for definite information concerning this doubtful species, but since then he has, I understand, written of it as the Victorian and South Australian (sub-specific) form of *F. frontatus* of New South Wales. Never having handled a *Falcunculus* at all, I am not competent to express an opinion of worth, but I have seen any number of young, and know that all the rest of the adult colours take strength before the darkness of the throat; so that small size and "entire under surface yellow" strikes one as hardly a broad distinction. The adult Shrike-Tit is really a much smaller bird than it appears to be from a distance when the heavy crest is erected. When the bird is close to one, slimness of the body at once becomes noticeable. On some such occasions I have been struck, too, with the uncommonly warm yellow displayed on the back by individual birds of both sexes.

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**Great Brown Kingfishers and Starlings.**—Mr. G. Murray Black, of Lower Tarwin, states that a pair of Great Brown Kingfishers (*Dacelo gigas*) nested for a season or two in a box which he had put up in a tree for that purpose, but lately the Starlings drove them away and occupied the box for rearing their own brood. The native birds, not to be beaten, visited the box later in the season and paid the Starlings out by eating their young ones. Butcher-Birds (*Cracticus destructor*), Mr. Black states, frequently take his young chickens.—D. LE SOUËF. Melbourne. 30/7/15.

\* *Emu*, vol. xi., p. 105.

## Comparative Osteology of Harris's Flightless Cormorant (*Nannopterum harrisi*).

BY DR. R. W. SHUFELDT, F.A.O.U., Hon. Member R.A.O.U.,  
C.M.Z.S., &c., WASHINGTON, D.C.

WHEN Sharpe created the new genus *Nannopterum* to contain Harris's Flightless Cormorant of Narborough Island, of the Galapagos Group, he referred to it as "*Phalacrocorax alis brevissimis, quibus minime volare potest avis inepta*."\* This appeared in 1899, and three years after we were given the admirable paper in the *Novitates Zoologicae* by Dr. Hans Gadow on "The Wings and the Skeleton of *Phalacrocorax harrisi*" (vol. ix., 1902, pp. 169-176, Pls. XIV., XV.) In this classical contribution Dr. Gadow makes some extensive comparisons among Cormorants, including Harris's, in the number of primary and secondary feathers in the wings—a matter that does not fall within the scope of the present paper to discuss.

With respect to the skeleton, Dr. Gadow gives an excellent series of tables, in which all the principal bones of the same have been compared by accurate measurements (millimeters) with the corresponding ones in skeletons of *P. melanoleucus*, *P. bicristatus*, *P. novæ-hollandiæ*, *P. carbo*, *P. carboides*, *P. varius*, and *P. cristatus*.†

There is, however, very little comparative descriptive osteology in Dr. Gadow's contribution to the study of the skeleton of *Nannopterum harrisi*, while his instructive figures of the bones of that Cormorant, on the two plates, are diagrammatic rather than actually representative of what they are called. Such parts of the skeleton as the skull, the vertebral column, pelvis, and pelvic limbs are not figured at all. On the other hand, his discussion of the effects upon the skeleton of the pectoral limb, and the primary and secondary feathers of the wings, due to an abrogation of the power of flight, is most interesting.

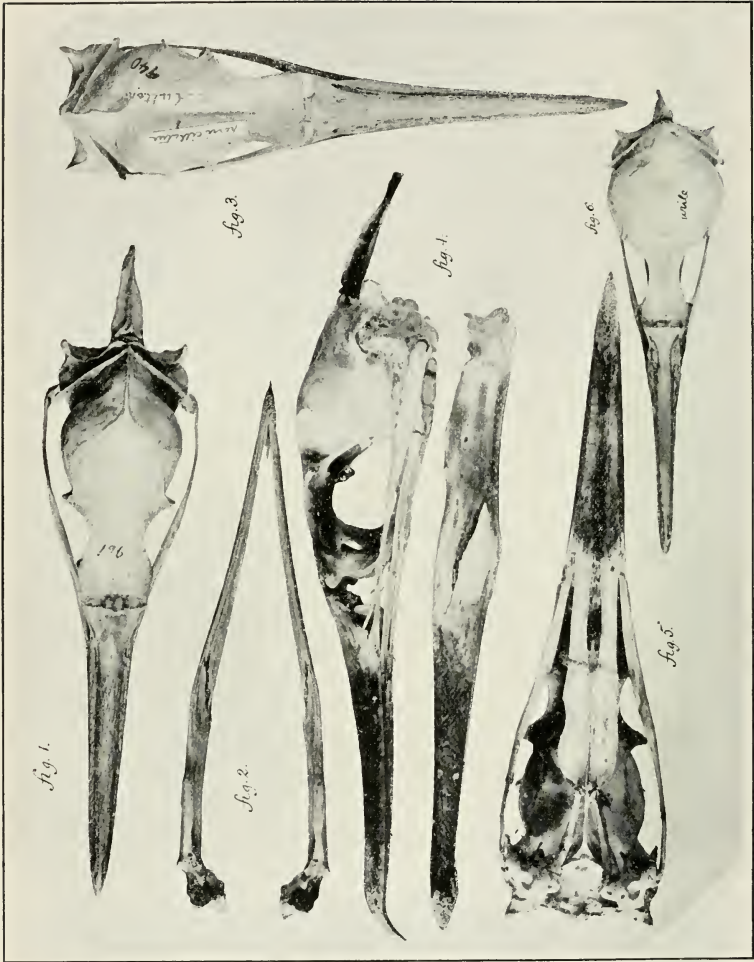
In regard to this he says, with respect to the skeleton of the arm, that "Change in the power of flight is above all correlated with increased length or shortening of the forearm. Next, the hand is affected, last of all the humerus. A much degenerated hand-skeleton is a sign of extreme reduction" (*loc. cit.*, p. 172).

Other points discussed by Dr. Gadow will be taken up here in connection with the various parts of the skeleton to which they

\* Sharpe, R. B., "Hand-list of Birds," vol. i., p. 235. In this place he also invites attention to the following literature:—*Phalacrocorax*, Rothsch., Bull. B.O.C., vii., p. lii., 1897; Ogilvie Grant, "Cat. Birds," xxvi., p. 655, 1898; also Rothsch., *loc. cit.*, p. 655, for *N. harrisi*.

† In Sharpe's "Hand-list," vol. i., pp. 232-234. I fail to find of this list *P. novæ-hollandiæ* (*Plotus novæ-hollandiæ*?), *P. carboides*, or *P. cristatus*; the remaining four species are well-known forms. Skeletons of other species, not included in his tables, were before him, as *P. albiventer*, *P. graculus*, *P. filamentosus*, *P. lucidus*, *P. capensis*, *P. gaimardi*, and one he calls *P. brasiliensis*.





refer. As he in no way refers to the *skull* of *Nannopterum* in his article on its osteology, I shall dispose of that important part of the skeleton before so doing.

During the past thirty years I have published a number of papers on the osteology of the *Phalacrocoracidae*, the most formal one being a memoir on the subject, entitled "The Osteology of the *Steganopodes*" (Mem. Carnegie Museum, No. 3), in which a very full account is given, illustrated with numerous plates of the skeletons of quite a number of existing and extinct Cormorants from various parts of the world. Since that memoir was published, however, the number of *Phalacrocoracine* skeletons in the collections of the United States National Museum has been substantially increased, and there are now to be found, among other valuable additions, no fewer than five more or less complete skeletons of *Nannopterum*. These, with others of the *Phalacrocoracidae*, have been placed at my disposal by that institution for the purposes of description. For this courtesy I am much indebted, and in connection therewith I have to thank Dr. Charles W. Richmond and Mr. J. H. Riley, of the Division of Birds of the Museum, for their kindness in transmitting me this valuable material.

I find, in addition to the five skeletons of Harris's Cormorant referred to above, those of *P. carbo*, *P. punctatus*, *P. auritus*, *P. urile*, *P. magellanicus*, *P. penicillatus*, *P. vigua*, *P. albiventris*, *P. pelagicus*, *P. perspicillatus*, and others.

*The Skull* (see figures on Plate XV.)—All the skeletons at hand of this Cormorant belonged to fully adult individuals, but unfortunately the sex of no one of them is recorded. Their Museum numbers run—19,628, 19,719, 19,720, 19,721, and 19,722, which last is without a skull.

Measured in a straight line from the apex of the superior mandible to the most posterior point on the occipital condyle, the skull numbered 19,719 has a length of 162 millimeters; 19,720, of 160 mm.; 19,721, of 164 mm.; while the one numbered 19,628, which certainly belonged to an old bird, measures in length but 147 mm. Disregarding this last skull, the average length of the skull of this Cormorant, based on the measurements of the first three, would be 162 millimeters.

Apart from these less important, though longer, transverse cranial diameters, and selecting the one of the brain-case at its widest part for comparison, skull No. 19,719 has a maximum width, through the broadest part of the parietal region, of 32 millimeters; 19,720, of 32 mm.; 19,721, of 32.5 mm.; while 19,628 measures but 30 mm. In the frontal region, superiorly, the shortest distance between the orbital peripheries in the first three skulls measures 18 mm., while in No. 19,628 the same transverse diameter measures but 13.5 mm. (See fig. 1, Plate XV.)

Unless there be a sexual difference here, this is a remarkable case of individual variation in the matter of size, especially when skull No. 19,628 belonged to a very old bird, and one with an

unusually large "occipital style," and with great rigidity of the cranio-facial hinge. I have no explanation at hand for this discrepancy. It has almost the appearance of having belonged to some other species; and had I at hand nothing beyond the four above-mentioned skulls to represent *Nannopterum harrisi*—that is, the ones numbered 19,719, 19,720, and these being in such close agreement in all particulars—this one (No. 19,628), being so much smaller, and exhibiting, as it does, some other slight differences, I certainly would have been justified in taking it to be the skull of some other species of *Nannopterum*.

Other species of Cormorants, however, exhibit the same differences in size, where the skulls all appear to have belonged to fully adult individuals; for example, in the case of *P. perspicillatus*, one skull at hand (No. 940, Coll. U.S. Nat. Mus.) has a length of 143 millimeters, while another (No. 18,535, Coll. U.S. Nat. Mus.) measures but 126 mm. in length, and with all other measurements and diameters proportionately less. The same thing is also found to obtain in *P. urile*, one skull at hand having a length of 117 mm., and another, from an adult, but 113 mm.—the first being No. 12,502 and the latter No. 12,505 of the collections of the U.S. National Museum.

Up to the present time, classifiers of the Cormorants seem to have held—and still hold—very diverse opinions as to the generic and sub-generic divisions of the family. Ridgway retained in the genus *Phalacrocorax* all the known species of North America, and if he considered the genus composed of two or more sub-genera, he has not designated them by name in his "Manual." Coues, on the other hand, recognized no fewer than six sub-genera for the genus *Phalacrocorax*, taking into consideration the North American forms alone ("Key," 5th ed.) Of the world's Cormorants, Sharpe, in his "Hand-list," places 41 species of these birds in the genus *Phalacrocorax* without any sub-generic distinctions, including among them *Phalacrocorax perspicillatus*, which he claims to be "extinct"; then, with this form, and this form alone, creates for it the genus *Pallasicarbo*, giving us *Pallasicarbo perspicillatus*! Here, then, the same species is placed in two different genera in the same work. We also have here *Nannopterum harrisi* and the fossil genus *Actiornis* with one species—*A. anglicus*. There are also some ten fossil species in *Phalacrocorax* in the "Hand-list."

Turning next to the A.O.U. "Check-list" for 1910, we have *Phalacrocorax* divided into three sub-genera—viz., *Phalacrocorax*, *Compsohalieus*, and *Urile*, while Pallas's Cormorant (*Phalacrocorax perspicillatus*) occurs nowhere in the volume, not even in the index, among birds living or extinct.

These facts are set forth here with the view of economy in the matter of making comparisons of the skull of *Nannopterum* with other Cormorants, for the skulls of the species belonging to the *Phalacrocorax* series of the A.O.U. "Check-list" differ very markedly from those of the *Urile* series, holding apparently a

middle place between them, though evidently very near the first-named group generally, if separated from it at all. In fact, a skull of *P. penicillatus* (No. 940, Coll. U.S. Nat. Mus.) agrees very closely in all of its essential characters with the skull of *Nannopterum harrisi*—at least, with the one belonging to the collections of the U.S. National Museum numbered 19,628; and, character for character, this agreement is nearer than it is in the case of the aforesaid skull of *Nannopterum harrisi* and that of *Phalacrocorax carbo* (No. 18,851, Coll. U.S. Nat. Mus.) Dr. Gadow claims, in his article in the *Novitates Zoologicae*, that *P. carbo* is the "nearest ally" of *Nannopterum harrisi* (p. 169). I must believe that he did not have before him at the time a skeleton of *P. penicillatus*, though he did have a skin of that species (*loc. cit.*, p. 170).

From what has been set forth above, then, it is clear, in comparing the skull of *Nannopterum harrisi* with the skulls of other Cormorants, that we may pay but scant attention to those of the *Urile* series, while the direct comparisons should be made with the skulls of the typical representatives of the *Phalacrocorax* series, especially with those of *P. penicillatus*, *P. carbo*, *P. perspicillatus*, *P. auritus*, and their immediate allies. The reason for this will at once be apparent after comparing the skulls shown on Plate I. of the present paper and those on Plate XXIV. of my "Osteology of the *Steganopodes*," where views of this part of the skeleton of some five other species of Cormorants are presented, while still others occur in the text (pp. 184, 186).

There appear to be four principal types of skulls met with in the *Phalacrocoracida*. The first of these may be designated as the *Urile type*, wherein the skull is smaller than in the others, of a lighter and more delicate structure. The superior mandible is rather lengthy, and the cranium compressed from above downward. The occipital line and crest is somewhat reduced, and the *occipital style* small. Over the parietal region, in the mid-longitudinal line, the surface is smooth and the crest absent. At its mesial inferior angle the lacrymal is connected with the mesethmoid by a slender, bent bar of bone, which is larger and stronger in the remaining three types. (In *P. urile*, No. 12,502, Coll. U.S. Nat. Mus., there is a long, free, very slender *vomer* present.) The *foramen magnum* is very large in proportion to the size of the skull. The occipital line and crest meet in the middle line at the site where the occipital style articulates.

In the second type, which may be designated as the *penicillatus type*, the skull is stronger and less delicately fashioned; the superior mandible is long and somewhat acute; the cranium is not nearly so much compressed from above downward. The occipital line and crest are conspicuously developed, and the interparietal crest is also present as a sharp, raised line, running from the facet for the occipital style forwards to a point over the centre of the cerebral casket, where it bifurcates and continues forward and laterally either way to the apex of either squamosal process. The occipital line and crest do not meet at the facet

for the articulation of the occipital style. The occipital lines meet each other in the middle line, several millimeters anterior to this facet, in the interparietal crest. There may be a rudimentary *pars plana* present on either side, and the maxillo-palatines considerably developed. Transverse frontal area on superior aspect of cranium, between the orbits, broad. This is the group or type to which *Nannopterum harrisi* belongs.

Passing to the third group, which may be designated the *carbo* type, we find the superior mandible to be much shorter. The cranium is large and strong, exhibiting no vertical compression, nor is it especially broad. The foramen magnum is much smaller, both actually and relatively, than it is in the two foregoing types, and the cranio-facial hinge is more or less inflexible.

Lastly, we have the *perspicillatus* type, in which the cranium is compressed from above, downward to some degree, very broad and thick. *Pars plana* is better developed; the great vacuity in the anterior wall of the brain-case, present in all the other types, is here vertically divided in the middle line by a slender bar of bone. The cranio-facial hinge is more mobile, and, as in the types two and three, the squamosal and post-frontal processes are developed, especially the latter. These are practically absent in the *Urile* type of skull. The occipital crest and occipital line are more separated, as in the *penicillatus* and *carbo* types.

Lucas, in his description of *P. perspicillatus*, states, and I reproduced the statement in my "Osteology of the *Steganopodes*," p. 168, that "the absence of external narial openings is also a secondary character, for the young Cormorant possesses perfectly open nostrils, while the cranium is almost as schizorhinal as that of a Gull. As growth proceeds the narial openings become more and more restricted, until, about the time (the exact time is uncertain) that the young birds take to the water, not only the external openings, but those of the cranium, have become completely filled."\*

While the nostrils are obliterated in all adult Cormorants, in so far as the superior mandibular theca is concerned, I very much question that they are entirely obliterated in the osseous mandible of the skull; they certainly are not in any of the skulls now before me—that is, if the more or less conspicuous foramen at the posterior ending of the nasal groove passing down the lateral aspect of the superior mandible on either side does not represent what remains of these openings. In some skulls I find a second and smaller foramen at some little distance in advance of the one here referred to. It also lies in the track of the nasal groove, and, as in the case of the large one, leads directly backward into the rhinal chamber, just as the narial passage would do were it present. Moreover, the larger and more posterior of the two foramina, when two are present, is always situated at the anterior margin of the nasal bone where the avian nostril commonly

\* Lucas, F. A., Proc. U.S. Nat. Mus., 1889, pp. 88-94.

terminates, and where it does terminate in a young Cormorant. They are double in *Nannopterum*, and usually rather small. This species may even have *three* such foramina on either side (No. 19,721, Coll. U.S. Nat. Mus.) They are large in Pallas's Cormorant (No. 19,417, Coll. U.S. Nat. Mus.), and nearly as big in *P. carbo*. Although I have not dissected a Cormorant lately, I would not be surprised to find that these several foramina transmitted both nerves and vessels to the structures of the superior mandible beneath its theca; but, even if this be so, it would not disprove what has just been set forth as to their being at the same time the remains of the nasal apertures, and I must believe that they are.

The plate of the *mesethmoid* in *Nannopterum* exhibits near its centre quite a sizable vacancy. This opening, in the same locality, is also present in the skulls of *P. urile* (where it is very large), *P. auritus*, and *P. penicillatus*, but is never found in Pallas's Cormorant or in *P. carbo*—that is, in the crania of adult birds.

In all Cormorants the *presphenoid* exists as a conspicuous *keel*, co-ossified in the middle line on the ventral aspect of the brain-case, extending from the basitemporal to a point above the pterygo-palatine articulation, from which point, as a straight, narrow bar, it bounds the immense interorbital vacancy below, till it merges, anteriorly, with the mesethmoid, projecting in front of the latter as a prominent, sharp spinelet. Sometimes the floor of the cranial casket, upon one side or the other of this sphenoidal keel, may be so thinned as to have, as a result, a vacancy of some size remain in it. This is the case in the skull of one of the specimens of Harris's Cormorant (No. 19,628), also in *P. penicillatus* (No. 940), where it is much smaller. In *P. carbo* the floor of the brain-case in this locality is very much thicker than it is in the two Cormorants just mentioned, and no such foramen is ever left there after cranial ossification is complete in the adult. In all Cormorants the *basitemporal area* is small and concaved. These birds have the osseous chamber of the ear much exposed, and a free, bony *siphonium* leads into it upon either side.

The massive *quadrates*, the big *pterygoids* with their sharpened superior borders, and the large, posteriorly-fused *palatines*, are all so well seen in fig. 5 of Plate I. of this paper that it would be superfluous to give any detailed description of these parts.

With respect to the *mandible* in *Nannopterum* (figs. 2 and 4, Plate XV.), the bone presents the same general pattern we find it to possess in Cormorants at large, and this has been quite fully described in my "Osteology of the *Steganopodes*" (p. 169).

In *P. carbo* the distal symphyseal part of the mandible is conspicuously bent down (No. 18,851, Coll. U.S. Nat. Mus.), which is not the case in any other Cormorant before me at this time, including Harris's.

In my description of the skull of *Anhinga anhinga* (*loc. cit.*, pp. 151, 152, figs. 3, 4, *sr. m.*), I gave a short description of a bone found articulating with the distal extremity of the maxillary,

on either side, and there called the *supramaxillary*. This bone has probably been lost from the skulls of *Nannopterum*, but I find it present and well developed in the skull of a specimen of *P. auritus* ("*P. dilophus*," No. 19,262, Coll. U.S. Nat. Mus.), where it agrees with what we find in *Anhinga*. It will undoubtedly be found to be present in other Cormorants, especially in *P. carbo*, which species has a skull very much like that of *P. auritus*—that is, the one referred to above.

*Nannopterum* presents nothing peculiar in the *sclerotals* of the eyes; the platelets, with their rounded angles, number in either circle from 15 to 18 pieces. They overlap in the usual manner, and the anterior ones are smaller somewhat than the posterior one, the gradation from before, backward, being gradual. (No. 19,628. — Antero-posterior diameter of inner circle equals 11 millimeters and the outer 16 mm.) They agree in *P. auritus*, where the eye is smaller than it is in Harris's Cormorant.

Cormorants have the osseous elements of the tongue much reduced; some of its parts never ossify, as is the case with the *glosso-hyal*, the *uro-hyal*, and the *epi-branchials*. The *basi-hyal* has a length of only 6 millimeters, it being wedge-shaped anteriorly, and its sides prominently concaved with a mid-longitudinal keel on its ventral aspect. In front it supports the cartilaginous *glosso-hyal*, while posteriorly the long *cerato-branchials* articulate with it by their enlarged, laterally compressed anterior extremities, side by side. There is no *uro-hyal*. Either of these *cerato-branchials* is a somewhat stoutish rodlet with a length of 48 millimeters. In form they are somewhat cylindrical and very slightly curved upward, their distal tips being in cartilage, which latter may represent the *epi-hyal* elements.

In *P. auritus* the osseous parts of the *hyoidean apparatus* are slenderer than they are in *Nannopterum*, the *basi-hyal* being much pressed from side to side in its continuity, while the *cerato-branchials* are very much more curved from before, backwards; otherwise they agree, anatomically, with what has been described above for Harris's Cormorant, and very probably other members of the *Phalacrocoracidae*.

#### THE SKELETON OF THE TRUNK.

As stated above, Dr. Gadow, in his paper on Harris's Cormorant in the *Novitates Zoologicae*, recorded many measurements he made of the bones of Cormorants. Among them ("Table A," p. 171) he gives the length of the trunk skeleton in *Nannopterum harrisi* as 240 millimeters. This must have been a much larger bird than any of those I now have before me; for in the case of the two largest ones, this part of the skeleton, measuring from the most anterior point on the 19th cervical vertebra to the most posterior one on the last uro-sacral vertebra—or the last one fused with the sacrum—I find the length to be, in both cases, but 190 millimeters.

Fearing that I might have made some error with respect to the

vertebrae, although I do not think I did, I determined to test it with some rigid long bone of the skeleton, and selected for the purpose the *humerus*. Dr. Gadow found this bone in his skeleton of *Nannopterum harrisi* to have a length of 101 millimeters (*loc. cit.*, Tab. A, p. 171).

The humerus in the skeleton of No. 19,720 of the U.S. National Museum collection, a large specimen of Harris's Cormorant, measures in total length fully 111 millimeters; in the one numbered 19,719, 111 millimeters; and the same bone in No. 19,721, only 98.5 millimeters; so that the lengths of the three humeri would give us an average of 106.8 mm., or over 5 millimeters longer than the big male *harrisi* that Dr. Gadow had before him.

The humerus of the specimen of *P. carbo* Dr. Gadow had had a length of 165 millimeters, and that bone of an individual of the same species in the Coll. U.S. Nat. Mus. (No. 18,851) has identically the same length; so I am inclined to think that the long bones in the pectoral limbs of these birds exhibit, when adult, but a very slight amount of variation. Further on I shall have something more to say about these measurements; the question was only introduced here in order to demonstrate such value as they possess in the matter of the total length of the trunk skeleton in *Nannopterum harrisi*.

Harris's Cormorant stands among the largest of the *Phalacrocoracidae* in the world's avifauna, and the fact of its having lost its power of flight has, *pari passu* with the atrophy of its pectoral limbs and certain parts of its sternum and shoulder-girdle, resulted in an augmentation in size and strength of most of the bones in the remaining parts of its skeleton. In this category the *vertebral column* and *pelvis* hold a prominent place, while the skeleton of a pelvic limb is, actually as well as relatively, better developed than that of any other Cormorant at present known to me.

In the *cervical section* of the *spinal column* the first 18 *vertebrae* are without free ribs. The 19th *vertebra* is free, and supports a pair of long, slender ribs. These have elongate, well-developed *epipleural appendages* upon them; but the ribs themselves are not articulated with the sternum through costal ribs. In this Cormorant the 20th and 21st *vertebrae* fuse solidly together to form one piece, the *ribs* on the 20th being longer and stouter than the pair on the 19th, though they still fail to connect with the sternum by means of costal ribs. It is interesting to note that in both pairs of these ribs their lower free extremities are *knobbed*, just as though the usual provision had been made for articulation with costal ribs; but the latter, as I say, are *non est*, neither are the vestiges of facets to be seen on the costal borders of the sternum for them, indicating that these two pairs of ribs, in the ancestors of this Cormorant, did so articulate with the sternum through the intervention of such costal ribs.

As stated above, the 21st *vertebra* is completely fused with the 20th, even the large quadrate neural spines being included in the

fusion, while the hæmal spine of the 21st vertebra—also a long, stout one—plays its part in forming the contour below of this united bone (fig. 16, Plate XVII.)

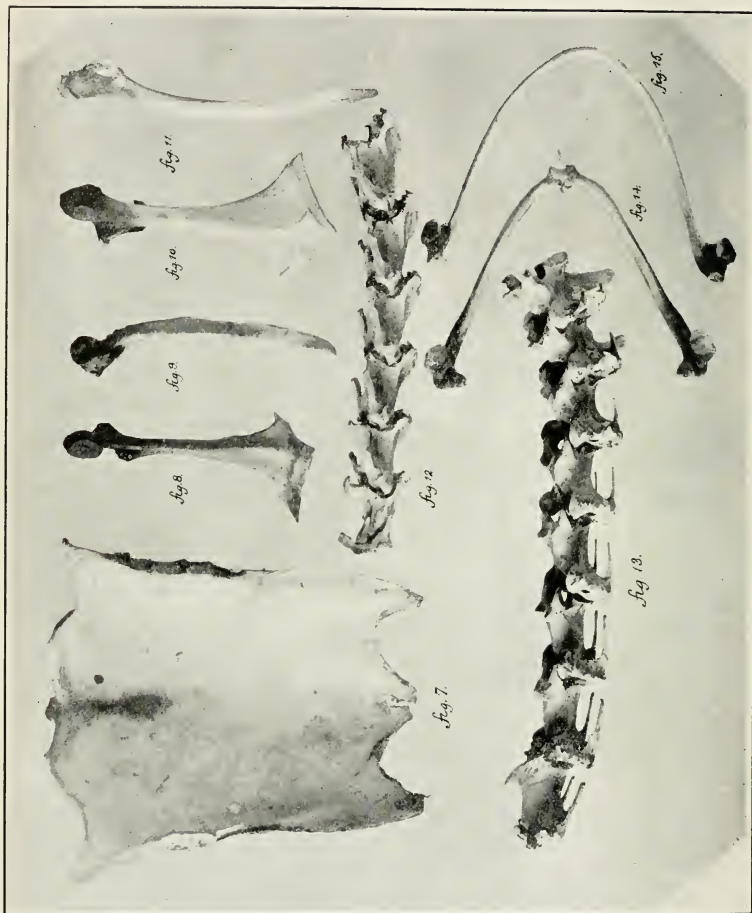
Between the vertebral element formed by the fused 20th and 21st vertebræ there are two others in the dorsal region of the spine and the pelvis. These are the 22nd and 23rd vertebræ of the column, and they are entirely free. Their ribs meet the sternum through elongate, stout costal ribs, as do the first pair of ribs coming from beneath the ilia of the pelvis and the pair on the 21st vertebra. All of these ribs are large, highly developed in every way, and support big *epipleural appendages*. The last pair of the series, however, or the second pair which articulate with the pelvic section of the column beneath the ilia, do not possess "uncinate processes," nor do their flattened and very long hæmapophyses reach the costal border of the sternum on either side. There is also a pair of "floating" costal ribs, each of considerable length, and they articulate with the posterior border, on either side, of the just-mentioned pair which precedes them.

This arrangement of the *ribs* also obtains in *P. urile*, but all the bones are slenderer and rather longer, and, all to the last pair, their unciform processes are very large and elongate, while those on the leading free pair of ribs of the series are conspicuously expanded. As in the case of *Nannopterum*, the free, lower ends of the ribs on the 19th and 20th vertebræ are "*knobbed*," while the *posterior* borders of the third, fourth, and to some extent the fifth pairs of ribs are sharpened, the lower part of which edge in the case of the fourth pair being perceptibly extended. In Harris's Cormorant these borders of the ribs are rounded.

In *P. vigua*, *P. auritus*, *P. carbo*, and doubtless other species, this arrangement is essentially the same as we find it in Harris's Cormorant, while slight differences may obtain in other species, as, for instance, in *P. punctatus* the last pair of ribs—that is, the second pair coming from beneath the ilia—have well-developed epipleural appendages upon them, and this is the only Cormorant I have met with that does have them on that pair of the series. But then *Phalacrocorax punctatus* of New Zealand presents a number of other peculiarities in its skeleton, which will be touched upon further on in this paper.

Returning to the *cervical vertebræ* of *Nannopterum*, we are to observe, in the case of the *atlas*, that its neural arch is a flat, smooth platelet of bone, broad and deep and nearly square in outline. Its postero-external angles are produced backwards and outwards as conspicuous apophyses, while the neural canal is large and transversely elliptical. The cup for the occipital condyle has a circular perforation at its base, and the hæmal spine is large, somewhat inclined backward, has sharpened borders and minute lateral processes above. These characters, with slight variations, are repeated in the atlases of other Cormorants, though in *P. auritus* the lateral apophyses on the hæmal spine are unusually well-produced.





Passing to the axis of *N. harrisi*, we find a bone having many striking characters. Its cylindrical neural canal is not more than half the size of that tube as it exists in the atlas, and the centrum projects far beyond its anterior opening. Distally, this supports the rather large, sessile *odontoid process*, below which the body of the bone is enlarged and concaved on its anterior aspect. Mesially, and below this, we find a deep pitlet, and posterior to this, on either side, a prominent little process. Above this, laterally, there passes, in life, the vertebral artery in a shallow groove there found.

The neural arch is much expanded, posteriorly, and produced backward far beyond the centrum. Its free borders are thickened, and its spine is represented by a low, median ridge or line. On the other hand, the hæmal spine is large and triangular, having an anterior sharpened border with its apex supporting an elliptical lamina of bone.

The postzygapophysial facets are flush with the surface of the nether side of the neural arch, one on either side of the entrance of the spinal canal. This is the position they likewise occupy in the *third cervical vertebra*, while the prezygapophysial ones, on the dorsal aspect of the bone—each elliptical in outline—are placed one on either side, above the large canal for the vertebral artery. The pleurapophyses commence on this vertebra as rather short, stout processes, and the hæmal—still of considerable size—is sharp in front and bifurcated below. On the dorsal aspect, the neural arch, still broad behind, inclines to curl forward, its outer angles being produced in that direction as minute spine-like processes, while mesially, at the same time posteriorly, a low neural spine develops. Fig. 12 of Plate XVI. shows these vertebrae—the leading seven cervicals—but their dorsal surfaces are toward the lower border of the plate, whereas they should be in the same position as the cervicals shown in fig. 13 of the same plate.

To include the *eighth cervical* they all exhibit, on the ventral aspect of the centrum, just posterior to the articulation, a notable concavity, which disappears in the succeeding vertebrae. The hæmal spines likewise disappear. There is but little change in the neural spine from what we found it to be in the third cervical, and the pleurapophyses do not change in any marked degree. The vertebral canals increase somewhat in size, and the vertebrae themselves gradually become larger and broader.

This *eighth cervical vertebra* of Harris's Cormorant is the leading one shown in fig. 13 of Plate XVI., and it will be noted there that the character of its neural spine has changed, it being well developed, and triangular, with its apex directed forwards. The post-zygapophyses in this vertebra are more individualized and forking.

In my "Osteology of the *Steganopodes*," cited above, I have given a full account of the peculiarities of the seventh, eighth, and ninth cervical vertebrae in various Cormorants, as well as in *Anhinga* and the Bitterns. This account is so complete that it is

quite unnecessary to enter, to any great extent, upon the subject here.

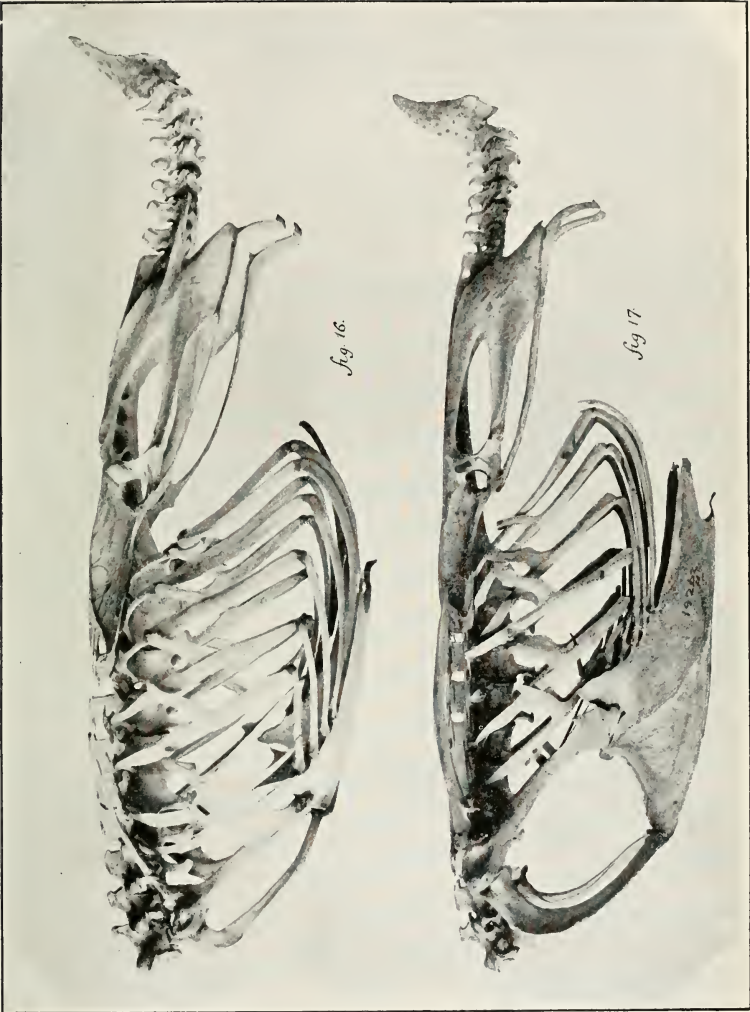
*Nannopterum* presents the same modifications of the three cervicals in question, only better marked than we find them in *P. urile* or *P. carbo* and others. In this eighth vertebra of Harris's Cormorant the rudimentary beginning of the *carotid canal* is in evidence; it is large and completely formed in ninth to the fourteenth inclusive, but in none is it quite closed in the median line below. In the 15th cervical its place is taken by a long, straight hæmal spine. A similar spine is found in all the rest of the vertebræ of the pelvis, and even here the character still obtains, though the process is shorter, while it becomes shorter and shorter in the next two following pelvic (dorso-lumbar) vertebræ, to be lost entirely on the next succeeding one (27th). There is a stumpy little neural spine on the 14th cervical; it is double the size on the 15th, and increases in size thereafter to the 19th vertebra, where it assumes the big quadrate form it has throughout the dorsal vertebræ.

The pleurapophyses of the 8th to the 11th inclusive are long and moderately slender, the longest pair being on the ninth cervical. Ventrally, the centra of the 16th to the 18th cervical inclusive are very broad and flat, while they promptly change in the dorsal series to become markedly compressed from side to side.

The facets for the ribs are extensive, considerably elevated, and each pair is strictly confined to the vertebra to which it belongs; in other words, there are no demifacets as we find in some of the vertebrata elsewhere. On the under side of a transverse process, extended between the facet on the centrum of the same vertebra to the facet at the outer end of the transverse process, there is a very prominent raised ridge, so that, when the rib is duly articulated there, this ridge practically comes in contact with the entire dorsal surface of its neck, and thus greatly increases the solidarity of its articulation with the ventral side of the transverse process on either side. Two such similar ridges are provided for the two pairs of ribs that articulate beneath the ilia of the pelvis.

Nineteenth and twentieth vertebræ fuse together in *P. auritus*, as they do in Harris's Cormorant, but not so in *P. urile* or in *P. carbo*. They also remain distinct in *P. pelagicus*, but not in *P. punctatus*. To a certain extent, for any particular species, age would have something to do with this, and it is possible that in old, or very old, Cormorants of any species we might find those two vertebræ firmly fused into one bone.

Dr. Gadow points out in his paper (*loc. cit.*, p. 174) that the three specimens of Harris's Cormorant examined by him "possess, like other Cormorants, 18 cervical and 2 cervico-dorsal vertebræ, and the 29th forms the last pre-acetabular buttress"; and further on, on the same page, he states:—"The two sacral vertebræ of *P. harrisi* seem to be the





32nd and 33rd, so that this region of the whole sacrum contains one more vertebra than other Cormorants. The following post-sacral, caudal, and pygostyle vertebræ exhibit no more than, or rather as much, individual variation in numbers and connections as other species. The pygostyle begins with the 48th vertebra—in one specimen apparently with the 49th—but it is, unfortunately, not possible to determine how many vertebræ have been fused into the pygostyle. It is possible that the additional vertebra contained in the presacral complex of the sacrum, and thus lengthening the whole pelvic region, accounts for the unsatisfactory results which we arrive at by comparing the proportions of length of pelvis to the bones of the hind limbs of *P. harrisi* with other Cormorants."

As stated above, I have at this time five pelvises of Harris's Cormorant at hand, and they present similar differences, due to individual variation, that Dr. Gadow found to obtain in his three specimens.

In all *five* of the skeletons belonging to the collections of the U.S. National Museum (Nos. 19,628, 19,719, 19,720, 19,721, and 19,722) it is the 24th vertebra that is the first of the spinal column which fuses with the ilia in the formation of the pelvis. It is the anterior one of the series that forms the pre-acetabular vertebral part of the pelvis, which terminates at the anterior peripheries of the acetabulæ. These are easily counted, for their transverse processes, abutting against the ventral surfaces of the ilia, are in plain sight.

Dr. Gadow, as just stated, found the 29th vertebra to form "the last pre-acetabular buttress," and so it does in Nos. 19,628, 19,721, and 19,722 of the specimens here being considered; while in Nos. 19,719 and 19,720 it is the 30th vertebra that does so, instead of the 29th. Then follow two more, in which the transverse processes have been almost entirely aborted. These two vertebræ are directly between the acetabulæ; their centra are large, and the spinal canal, as it passes through them, is at its maximum calibre for this part of its continuity. In No. 19,719 and 19,720 these two vertebræ are the 31st and 32nd, while in the other specimens they are the 30th and 31st. Next follow *two* vertebræ which are the true *sacral vertebræ*. In Nos. 19,719 and 19,720 these are the 33rd and the 34th, while in the remaining three specimens they are the 32nd and 33rd.

If we reckon the last *uro-sacral vertebra* to be the last one that fuses with the pelvis, then in No. 19,719 this vertebra is the 42nd; in No. 19,720 it is the 43rd; in 19,628 it is the 40th; while in Nos. 19,721 and 19,722 it is the 41st.

This is rather a remarkable variation, and I could scarcely believe it until I had made the count with the greatest possible care several times over.

No. 19,719 has 7 vertebræ *plus* the *pygostyle* in the skeleton of its tail (43rd-49th + P.); No. 19,720 has 44th-48th + P.; but I am inclined to believe that the last caudal vertebra has been lost

in this skeleton, for the reason that that vertebra always has *shorter* transverse processes than the one next preceding it. In No. 19,721 the caudal vertebræ include the 42nd to 48th, being 7 in all, to which the pygostyle is to be added; in 19,722 the skeleton of the tail is probably in the skin of this specimen, which was preserved, and so the count cannot be made.

Finally, we have No. 19,628, in which, differing from all the rest, although it has seven vertebræ and the pygostyle in its tail, these vertebræ are the 41st to the 47th inclusive.

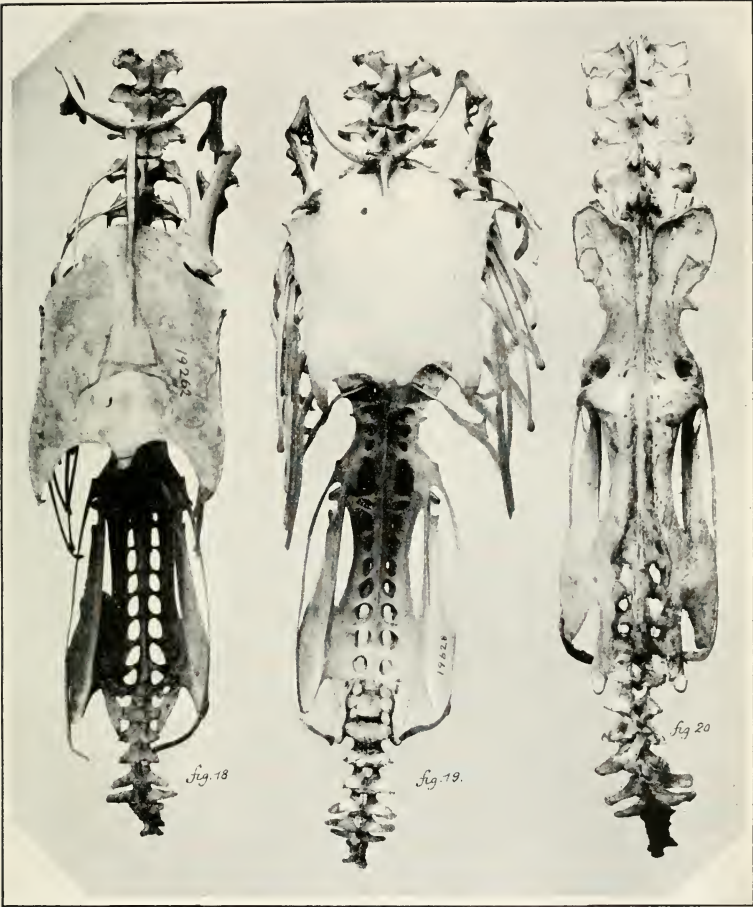
As to the *number of vertebræ in the pygostyle*, I should say that there were about *seven*, although there can be no certainty about it until they have been correctly counted in many young Cormorants at different ages and proper stages of development. There is no difficulty in making out the leading *five* vertebræ in the pygostyle of a Cormorant, and the posterior pointed looks as though it might contain two more.

Harris's Cormorant has the caudal vertebræ and pygostyle of great size—in fact, of comparatively massive proportions, with all the main processes well developed. This is not the case with many other species, where, although they are fairly well developed, the caudal vertebræ rarely exceed *six* in number, and the added pygostyle may be small in comparison. This is the case, to some extent, in *P. albiventris*, while *P. punctatus* possesses seven caudals and a good-sized pygostyle. Doubtless there is an individual variation in the number throughout the family, while in general terms it may be said that *Nannopterum* usually has *seven* caudals and a pygostyle, and most all other Cormorants but *six* and a pygostyle.

Good views of the *pelvis* of *Nannopterum harrisi* are presented in figs. 16, 19, and 20 of the plates accompanying this paper. This part of the skeleton is also liable to vary in different individuals, while in old birds of the species it is always a big, strong, and massive bone. As a whole, it assumes the narrow, elongate form seen among water-birds of the Cormorant class.

Viewed from above, it will be observed that the pre-acetabular part of the bone is very considerably less than the post-acetabular, and that its spreading anterior portion is horizontally disposed, the surface rapidly becoming sub-vertical as we pass backward to the acetabulæ. In front the surface is roughened and lined for muscular insertion, and is often perforated here and there by small vascular foramina. Either antero-lateral angle is rounded off; the anterior border exhibits a raised and definite emarginate finish, with generally some small, blunt processes extending directly forwards. We also find occasionally one or more conspicuous apophyses outstanding from the lateral borders of this pre-acetabular portion of the pelvis, and one of these is shown in fig. 20 of Plate XVIII., the left-hand side one having been broken off.

Anteriorly, there is a re-entering angle between the ilia, far into which projects the neural spine of the first "pelvic vertebra."





Mesially, the ilia form a solid crista the entire length of the bone, which, in the pre-acetabular region, is finished off with a horizontally spreading lamina having an average width of some 4.5 millimeters. This disappears at a point in advance of the acetabulæ, and the ilia and "crista" fuse in the same plane. As we pass posteriorly, however, the latter again comes more and more in evidence with its thickened border, until it reaches its maximum height, at its posterior termination, where it is as high as the neural spines of the caudal vertebræ. In the post-acetabular region the mesial margins of the ilia gradually curve away from the sacral crest, which curvature terminates at the place where the mesial margins of the ilia articulate with the transverse processes of the uro-sacral vertebræ (fig. 20).

There are large interdiapophysial foramina among the last three uro-sacral vertebræ; but anterior to these such openings become, as a rule, very small. A little way back of either antitrochanter, on the dorsal aspect of the pelvis, there is a big, rough elevation for muscular insertion. *P. carbo* and *P. urile* possess similar tuberosities on their pelves, while in a number of other kinds of Cormorants they are present, but not especially noticeable.

Regarding the pelvis of *Nannopterum* on side view, it is to be observed that a rudimentary *prepubic spine* is a character constantly present, and that the *cotyloid ring* or *acetabulum* is very large, as is the massive antitrochanter. As a matter of fact, all this part of the pelvis in Harris's Cormorant is of the most substantial sort, as, indeed, is the entire pelvic structure.

The *ischiac foramen* is a very large, elliptical vacuity, and, being so large, tends to lighten greatly the pelvis as a whole. So, too, we find the *obturator foramen* of good size and almost continuous with the *obturator space*, which latter is a vacuity nearly as large as the ischiac foramen. Posterior to it there is a broad, flat area of bone, formed about equally of the ischium and ilium, the free, moderately sharp border of the former being deeply convex outward. The pubic element or style articulates here, broadening as we follow it backward, then thickening, turning very abruptly toward the mesial plane, and terminating with an expanded tip.

Where this pubic element bounds the obturator space below, however, it is a very slender and long rod of bone—in fact, slightly slenderer than the quadrato-jugal arch of the skull, and no stronger than the lower part of the fibula in the leg.

A very deep, triangular notch indents the posterior border of the pelvis, it being the ilio-ischiac notch, and is characteristic of the pelvis in the *Phalacrocoracidae* generally. It results in converting the hindermost extension of the ilium into a long, strong, backward-directed, straight process, which, with the aid of the corresponding process of the other side, furnishes great protection to the leading caudal vertebræ. (See figs. 18, 19, and 20 of Plate XVIII.)

At the anterior extremity of this pelvis of *Nannopterum* there will be observed the marked downward extension of the first three vertebræ beneath the ilia. The transverse compression of them is very great, and all of the three hæmal spines sent down by them are much in evidence, forming, as they do, a very striking feature of the pelvis, not only in this flightless Cormorant, but in the pelvis of most of its relatives in the genus *Phalacrocorax*.

The posterior articular facet on the centrum of the 21st vertebra, or the hinder one of the two together-fused vertebræ of the dorsal region of the column, is alongo-elliptical in outline, with the major axis vertical, and the whole markedly concave. This accounts for an ellipsoidal, convex facet on the anterior face of the centrum of the 22nd vertebra, which, in the duly articulated skeleton, fits accurately into the concave one previously described. This kind of articulation with facets of similar size and form—an opisthocœlous one—also obtains in the case of the last dorsal vertebra, and further accounts for the large, hemi-ellipsoidal facet on the leading vertebra consolidated with the pelvis beneath the ilia.

Ventrad, in the deep and ample pelvic basin, in the case of *Nannopterum*, there is an unusual variation to be noted with respect to the diapophysial braces thrown out on the part of the *two sacral vertebræ* that brace the pelvic walls directly opposite the antitrochanters. Sometimes these are both perfect and strong (No. 19,628); again, the anterior one on the right side may be absent (Nos. 19,719, 19,720, and 19,721, ♀); or the anterior ones may be stout and the posterior pair slender (No. 19,722). This, however, is a peculiarity that holds in the case of other, or at least some other, Cormorants.

In *P. punctatus* the pelvis is long and narrow, reminding one of the bone in some of the Loons or Grebes, notwithstanding the fact that all of its essential characters are strictly phalacrocoracine. In it, however, the obturator space is very long and narrow, with the pubic element bounding it below very slender, the distal, thickened part of which makes a very close articulation with the lower border of the ischium, which latter, at its postero-external angle, is produced to mould itself upon it, and passing which, the free extremity of the pubis is curved directly downwards and inwards, and in no degree backwards.

In nearly all Cormorants of the genus *Phalacrocorax* the inter-diapophysial foramina in the post-acetabular region, dorsad, are large, and most often occur as far forward as the antitrochanters. In them, too, the backward-extending process of the ilium, on either side, forming the mesial boundary of the "ilio-ischiac notch," is short—much shorter in proportion than we find it in *Nannopterum*.

*The Sternum.*—Harris's Cormorant has this bone fashioned along the lines of the typical "raft" pattern, as will ever be the case with any bird wherein the power of flight has, for many

generations, been entirely lost, and the wings have become reduced to mere secondary aids to locomotion under water.\*

At this writing, there are five practically perfect *sterna* of this flightless Cormorant before me; and, while they all offer essentially the same characters, there are, nevertheless, some very interesting differences to be seen among them upon comparison.

To be explained in one way or another, these *sterna* may, in the first place, differ markedly in *size*. For example, in all of them the *costal processes* are large, drawn out into a somewhat acute triangular form, and tipped off with a little bony nib. These nibs are good points from which to measure the extreme transverse width of the bone, and this width in No. 19,721 equals 84 millimeters, while in No. 19,628 it but equals 74 millimeters, and in No. 19,722 rather more, or 78 mm. Again, No. 19,721 has an extreme mid-longitudinal length of 89 mm.; in 19,628 this is again much less in comparison, equalling but 72 millimeters, and so on for the rest. In other words, whatever may be the actual size of the sternum, with respect to width and length, the fact remains that in its *form* it is nearly square in outline. It is also much flattened out from above, downwards, the general concavity of its ventral side not being as profound as in most all other Cormorants, as in, for example, *P. auritus*, *P. urile*, and *P. carbo*.

I find no exception to there being *four* large facets on either costal border whereon the hæmapophyses or "costal ribs" articulate. There are no pneumatic foramina among these—that is, in the oblong concavities separating them, or in the triangular one anterior to the leading facet or behind the last one; in fact, the sternum of *Nannopterum harrisi* is a non-pneumatic bone, like nearly all, if not all, of the rest of its skeleton. Some of the species in the genus *Phalacrocorax* have a pneumatic sternum, but not every one of them. It enjoys that condition in *P. auritus*, but not in *P. urile*, and so on.

The keel or *carina* of the sternum in Harris's Cormorant has become reduced to a mere rudiment of what that part of the bone is in those species of the *Phalacrocoracidae* that fully possess the power of flight (see fig. 7, Plate XVI.; fig. 16, Plate XVII.; and fig. 19, Plate XVIII.) Anteriorly, the "carinal angle" is still preserved and enlarged for its articulation with the *os furcula*, while but a remnant of the keel itself remains. This last is concaved upon either side, and in some specimens this concaving is so profound

\* Dr. Gadow, in a few forceful words, refers to what the skeleton of *Nannopterum* should teach us when he says that "An important and stern lesson, taught by this flightless Cormorant, a first-rate swimmer, is, of course, its analogy with *Hesperornis*, which, in spite of all that has been said about its structure and affinities by Furbringer and myself, occasionally still figures as a member of the *Ratitæ*. He has no keel, therefore he is a Ratite. *Fiat justitia, pereat common-sense!*" (*loc. cit.*, p. 173). It occurs to me that there were still others who very materially assisted in eradicating the erroneous notion that *Hesperornis* was some sort of a "swimming Ostrich"—Professor D'Arcy W. Thompson, for instance.

that the bone is very thin at the bases—so thin, indeed, that in some sterna the light can be readily perceived through it when the bone is properly held up to the sun or a flame (No. 19,720).

After quitting the hæmapophysial facets and their indentations, the lateral borders of the bone become sharp and thin, remaining so to their terminations.

Posteriorly, the xiphoidal border of the bone, in all Cormorants' sterna examined by me, present a somewhat broad, mesially notched, middle projection; at either postero-external angle a somewhat longer and narrower prolongation, while the so-called "notches"—one on either side—between them are moderately profound only, and sub-circular in outline (fig. 7, Plate XVI.)

In some specimens of Harris's Cormorant this pattern of its xiphoidal border exhibits some indications of absorption, as a shallowing of the "notches," and a disappearance of a part of the median prolongation.

All Cormorants have the dorsal aspect of the sternum very smooth, while a raised, rounded ridge passes backward from either costal border to meet, and merge completely, in the median plane posteriorly (*P. auritus*, *P. urile*, &c.) This is also found in *Nannopterum*, but is far more feebly marked: and in this bird, where the xiphoidal part of the bone begins to exhibit evidences of disappearance, this ridge behind has already disappeared. This is the case in all specimens now at hand.

Ventrally, the sternum of Harris's Cormorant is likewise smooth, its areas for muscular insertion having been reduced to a limited triangular area, bounded by a raised ridge on either side of the rudimentary carina. These concavities vary in different specimens with respect to their distinctness or depth. They do not show well in fig. 19, for example, for they are to some extent shallow in the sternum of that individual—in fact, the sternum of that bird has its "body" very thin in some places—so thin, indeed, that in one place a vacuity is formed, as may be noted in the round spot in the figure.\*

One of the most interesting features to be noticed with respect to the sternum of Harris's Cormorant is its anterior border. Here, the middle and above this is occupied by a rather deep, broad, and uniformly concave notch, with its concavity directed upward. This occurs just above the thick and shallow remains of the anterior border of the rudimentary keel, which is fashioned after the articulatory support of the *os furcula*. Far apart, and on either side, is found a deep, well-marked *coracoidal groove*, these being quite as much in evidence as they are on the sterna

\* The foramen in question might be taken for a shot-hole, but it is not, for its edges are sharp, clean, and unbroken. Two of the sterna of this Cormorant at hand have shot-holes in them—that is, No. 19,721, which received four, and No. 19,719, which has one. These all show the unmistakable diagnostic evidences or signs of gunshot perforations through an osseous plate, and are very different from such openings as are due to deficient ossification.

in most of the species of the genus *Phalacrocorax*. In no Cormorant, however, possessing the full power of flight are they so far apart, though we find a certain degree of separation in some species, as in *P. urile* and *P. pelagicus* (No. 19,655, Coll. U.S. Nat. Mus.), while in others a slight decussation is to be observed, as in *P. auritus*. Finally, in other species the mesial, inferior angles of the coracoids are simply in contact when duly articulated in their sternal grooves as in life (*P. magellanicus*).

*The Shoulder-Girdle* (Plate XVI., figs. 8-11, 14, and 15).—In most of the skeletons of *Nannopterum* at hand the *os furcula* is a broad, U-shaped one, possessing most of the characters of the bone as seen in Cormorants generally. The breadth of the U varies in different specimens; for example, in No. 19,721 the clavicular heads are 67 mm. apart, while in No. 19,628 they are but 54 mm., and in No. 19,719, a large bird, they are 74 mm. apart. Probably these figures represent the extremes in this matter. Either clavicular head is enlarged in the same way as it is in all true Cormorants, there being a short scapular process above, which, by the way, does not reach the scapula in the articulated skeleton, and an abutment bearing on its posterior aspect a flat, articular facet of sub-circular outline for the head of the corresponding coracoid.

The main arc of the *os furcula* exhibits some, though not a great deal of, reduction, and this likewise varies, being less in some individuals than in others. Some Cormorants have the clavicular arc of the *os furcula* doubly as stout as it is in any specimen of Harris's, as, for instance, *P. auritus* (No. 19,262, Coll. U.S. Nat. Mus.), where, likewise, it seems to be, to a certain extent, pneumatic. Every vestige of a *hypocleidium* in the *os furcula* of *Nannopterum* has disappeared; in the articulated skeleton, as in life, the bone simply rests against the smooth surface on the anterior face of the rudimentary keel of the sternum, being held in position by binding ligaments in the living bird. All other Cormorants, in so far as I have examined them, possess some sort of a *hypocleidium* wherewith to meet the carinal angle of the sternum in articulation (fig. 14, Plate XVI.)

A *coracoid* of this flightless Cormorant has a length, generally, of about 66 millimeters, though it may be much shorter, as it is in No. 19,628, where it is but 58 mm. long. Measuring its inferior angles from apex to apex, it may be broader transversely—everything else being equal—than is the coracoid in some other Cormorants. For example, the distance just mentioned measures 32.5 mm. in No. 19,721 of the series of Harris's Cormorant, while in an adult skeleton of *P. auritus* (No. 19,262) the same line equals 30 mm.

The upper extremity of the bone, which articulates with both the *os furcula* and the scapula, presents the characters found there among Cormorants at large, there having been no change beyond a certain amount of shrinkage (Plate XVI., figs. 8 and 10). The shaft of this coracoid, however, has become, through a uniform

and general reduction in calibre, much slenderer, and this has given prominence to the muscular line passing down its anterior aspect, especially at the lower part of its course.

The U.S. National Museum specimens do not support all that Dr. Gadow says of the coracoid of *Nannopterum* in his above-cited paper (*loc. cit.*, p. 172), for he states, in regard to this bone, that "The coracoids are much reduced in length and strength. Their feet have remained as broad as they were originally, but they have crept asunder to the extent of 18 mm., and the shafts have been diminished at their median sides." That they have become reduced in "strength" there can be no doubt, and, perhaps to a slight degree, in "length," while it would not appear that their "feet" have remained as broad as they were originally, although the anterior and posterior facets on them, for the coracoidal grooves of the sternum, have *increased in depth*.

In support of this, I would invite attention to the coracoid of an adult specimen of *P. urile* (No. 18,982). It was about as big a bird as was the Harris's Cormorant numbered 19,628 of the collections of the U.S. National Museum. Now, in that specimen of *P. urile* the *full width* of the foot of the coracoid—or that part of the sternal end of the bone which articulates with the coracoidal groove of the sternum—from angle to angle measures 24 mm., the same distance on the coracoid of the Harris's Cormorant measuring but 18 mm. The length of this coracoid of *P. urile* equals 72 mm., while in the specimen of Harris's it is but 58 mm. long. That the reduction in the calibre of the shaft did not take place exclusively on its "median side," as Dr. Gadow states, is evidenced in the coracoids of the skeletons at hand. I am compelled to believe that there was a general reduction of the bone, for the reason that in all Cormorants, including our *P. urile*, the process at the infero-external angle of the coracoid is very inconspicuous, while in *Nannopterum* it may attain a length of not less than *nine* millimeters. It has, beyond doubt, acquired this length by remaining almost its original size, while the shaft of the bone, on its own side, has shrunk *away from it* in the course of the diminution of its calibre as a whole. That this was the case is clearly evidenced in all the coracoids of this Cormorant now before me—that is, five pairs of them.

Everyone will agree with Dr. Gadow in his statement that "the reduction of the scapulæ is extreme" in *Nannopterum harrisi* (*loc. cit.*, p. 172), for not only has the head of the bone suffered much reduction, but likewise in the *length* of its shaft, the width or calibre of it not having changed to any appreciable degree. This is very clearly shown in figs. 9 and 11 of Plate XVI. of the present paper, where such excellent representations of these bones are given that any further description of them becomes quite unnecessary.

When articulated, as in life, the scapulo-coracoidal angle equals about 90° in *Nannopterum harrisi*, whereas in ordinary Cormorants this angle ranges between 63° and 70°. Again, when

thus articulated the shafts of the coracoids, in the case of Harris's Cormorant, come within a few degrees of being parallel to each other (Nos. 19,628 and 19,722). This degree of parallelism varies for different individuals, but it can be estimated; for example, if we draw a transverse line through the "feet" of the coracoids when they are normally articulated, then extend the lines of their longitudinal axes until they meet below the sternum, we will find that, from their point of meeting to the middle of the line drawn between the coracoidal feet, they have a length of some 73 millimeters. A corresponding line, in the case of *P. urile* (No. 19,655, Coll. U.S. Nat. Mus.), measures but 45 millimeters—the intersection of the extended imaginary lines, prolonging the longitudinal axes of the coracoids of this species, being opposite the posterior termination of the keel of the sternum on that bone. This goes to show that the angle formed by the extended longitudinal axes of the coracoids in *Nannopterum harrisi* is much more acute than it is in such a Cormorant as *P. urile*, and, consequently, the approach to parallelism is just so much the nearer in the former bird. They are, however, never absolutely parallel any more than are the articulated scapulæ, for when we extend, by imaginary lines, the long axes of the blades of the latter, when those bones are normally articulated in the skeleton, the point of intersection of those lines is posterior to them at a point about opposite the second caudal vertebra.

#### THE APPENDICULAR SKELETON.

*The Pectoral Limb* (fig. 25, Plate XIX.)—Harris's Cormorant has the skeleton of its wing quite as perfectly formed, and has in it just as many of the bones as has any other Cormorant known to me; it simply has suffered great reduction in size. Dr. Gadow has demonstrated that it has been "reduced to less than one-half of its normal size" (p. 171). As a matter of fact, the skeleton of this wing has all the appearance of one that might easily, without any alteration whatever, belong to some small species of Cormorant about the size of a Hooded Merganser (*Lophodytes cucullatus*). This has nothing to do with the characters the bones present, for the wing of *Nannopterum* is wholly Cormorant in particular and steganopodine in general. It is completely non-pneumatic, as is the case of the wing-skeleton in most all ordinary Cormorants. The humerus in *P. auritus* is an exception, for it is certainly pneumatic in that species (No. 19,262, Coll. U.S. Nat. Mus.), while it is never so in *P. urile*, but may be in *P. carbo*.

The pneumatic fossa of the humerus belonging to the skeleton of Harris's Cormorant (No. 19,628) is shallow and elongate, extending down the ulnar side of shaft for a distance of 20 mm., narrowing all the time until it merges upon the same at a point opposite where the *radial crest* terminates on the other side of the bone.

On the palmar aspect of this humerus, just within the proximal part of the radial crest, there exists a considerable concavity,

which is likewise large and deep in the same location on the humerus of *P. urile*, and, to a greater or less degree, seems to be present in the case of all Cormorants. In Harris's the shaft presents the same amount of sigmoid curve as it does in other species, and we also find the peculiar, in-turned extension of the ulnar trochlea of the distal extremity of the bone.

In length, this humerus differs considerably in different individuals, it being 101 mm. according to Gadow, while in No. 19,628 of the specimens here being examined it is 90 mm. In No. 19,719 it is 102 mm., being the same in No. 19,720, and so on.

As Gadow has already pointed out in his memoir, the greatest amount of reduction in the skeleton of the wing of this bird is to be seen in the bones of the antibrachium. for, while the *ulna* and *radius* are about of equal length, they are each very much shorter than the humerus. Moreover, it is to be noted here that the radius has lost the most of that peculiar double curve its continuity presents in other Cormorants, and so well exemplified in the radius of *P. urile*. Here, as in other Cormorants, when normally articulated, its distal moiety, or rather less, is parallel and close to the ulna, while the proximal half of the bone, from head to mid-shaft, curves away from its companion in the forearm, and thus creates, in that locality, a large "interosseous space."

With a gently curved shaft, which has double the calibre of that of the radius, the ulna of *Nannopterum* has lost much of that conspicuous process seen in other Cormorants, which curves about the head of radius and supports the facet of the lesser sigmoid cavity. Proximal fourth of this shaft, on its palmar aspect, is scooped out longitudinally to an extent both actually and relatively greater than we see it in other Cormorants, while the insertional points for the quill-butts of the secondary feathers are shallow pitlets rather than papillæ, as they are in *P. carbo* and its congeners. In *P. urile* these papillæ are paired, thus creating a double row down the shaft in this and probably in other species of these birds.

*Radiale* and *ulnare* of the carpal joint are rather large in proportion, as compared with the bones with which they articulate; but this is so slight that it would hardly be safe to say that their reduction had not proceeded quite so far, relatively, as the other bones with which they are in contact, although, judging by the eye alone, this appears to have been the case. If it be so, it is very slight. However, the transverse diameter of the *ulnare* enters into the length of the ulna's shaft in *P. carbo* eighteen times, while the corresponding diameter of the *ulnare* in *Nannopterum* enters into the length of the shaft of its ulna less than ten times.

Apparently there does not seem to have been the same amount of shrinkage, in proportion, in the case of the bones of *manus* as there has been with respect to the humerus and the radius and ulna of the forearm. The clawless terminal joints of the thumb and two fingers are all present, having been retained in





proportion with the *carpometacarpus* and proximal phalanx of *index digit*. As a matter of fact, were this wing of *Nannopterum harrisi* the wing of a bird the size of a Partridge, and possessed of the same muscles, ligaments, vessels, nerves, and other structures that it has in the Cormorant, that Partridge would surely enjoy the power of flight in a high degree. In other words, in its reduction this wing has so well sustained its proportions and factors necessary to its function that, while it is useless to this big Cormorant, except as an adjunct in swimming, it would be a most powerful structure for aerial locomotion, in the case of a bird of the proper size, to use it effectively.

*The Pelvic Limb.*—Compensation for the reduction in size of the bones of the pectoral limb is seen in the increased size and power of those of the posterior extremity here to be considered. This is especially the case with respect to the tibio-tarsus, though it is equally evident in all of the others composing this limb. From femur to unguis joints inclusive they are big, strong bones, and would well serve a Cormorant fully one-fourth larger than Harris's.

All the bones of the pelvic limb of this Cormorant are well shown in Plate XIX. (figs. 21-24), some of them on two different views.

From proximal to distal extremity the femur exhibits a general as well as a considerable curvature to the front, this stout bone, upon that aspect, being convex longitudinally. Its summit, though convex from before, backward, is otherwise in one plane, and devoted to the large, smooth facet for the antitrochanter on the pelvis. Large and semiglobular, the *caput femoris* is sessile as to the shaft, and, instead of a pit for the *ligamentum teres*, presents an extensive roughened surface. A broad trochanter major projects only to the front, while its outer surface—and extending round to the back of the shaft above—has upon it a number of prominent elevations for muscular attachment; others of these occur at the usual sites on the shaft below and above the condyles posteriorly. There is no trochanter minor, and the "rotular channel" is shallow. For its middle third the shaft is nearly cylindrical, and the condyles are very prominent posteriorly, where a deep pit is found between them in the middle line and above.

The usual sulcus for the head of fibula in the external condyle is deep and smooth.

Femora of *Nannopterum* range in length between 63 and 73 millimeters, being stout in proportion thereto.

From their general appearance, one would say that all the bones of this limb were non-pneumatic, while at the same time there are many minute foramina found in all the long bones, as well as in the patella, that need be accounted for. In the femur they occur about the head, and in the intercondylar fossa posteriorly. They are found about the proximal extremity of the tibio-tarsus and also of the tarso-metatarsus. If these be

"nutrient foramina," and not pneumatic ones, the bones of this limb have an abundant vascular supply.

In *P. urile* the femur, as compared with the one just described, is relatively longer with respect to the average, and considerably smoother and slenderer. For the size of the species, this likewise applies to *P. auritus*. The bone is especially smooth in *P. carbo* (No. 18,851, Coll. U.S. Nat. Mus.) and in other species at hand. In *P. punctatus* it is shortened and much bowed, almost reminding us of the femur in some Grebes, though the femur exhibiting the greatest amount of curvature belongs to *P. penicillatus* (No. 18,535).

The *patella* is very large, trihedral in form, with an extensive, squarish base, moulded to receive in articulation the larger share of the surfaces of the femoral condyles. Above its middle it has, passing transversely through it, a good-sized foramen, which, on the inner aspect, is at the base of a more or less circumscribed concavity there; while on the outer side it comes out about flush with the surface of the bone. This foraminal passage transmits the *ambiens muscle*, but I find it is not patulous in all *Phalacrocoracidae*. Garrod, who studied it in *P. carbo* and in "*P. lugubris*," remarks that "Meckel did not find the *ambiens* in the Cormorant; it is peculiar, in that it runs through the substance of the large triangular patella, in a bony canal" (Coll. Sci. Mems., footnote, p. 198). Possibly Meckel may have had a Cormorant where the *ambiens* does not pass through the aforesaid bone; this is a matter I have not looked up.

Patellæ of Cormorants I have figured in a number of my published papers; one of these figures Coues used in his "Key" (5th ed., vol. ii., p. 961, fig. 675, *P. bicristatus*), stating in the text that, with respect to Cormorants, "There is a bulky free patella, co-existent with a short cnemial apophysis or rotular process of tibia, but perfectly distinct therefrom, as in Grebes." Now, at the present writing, after having compared and studied this big seasmoid in a good many Cormorants, I am convinced that this statement is entirely erroneous. As to the patellæ and the *cnemial process* of the tibio-tarsus in Loons and Grebes, it has been correctly described by numerous ornithotomists, including myself. Coues, in the volume just cited, gives, on page 1,052, a figure—one of my own, unacknowledged—of a tibio-tarsus and patella of a Grebe. This is a correct drawing, and from it will be observed that the *cnemial process* of the tibio-tarsus (*a*) co-ossifies with and is a part of the latter, while the big, free patella is in close contact with its posterior surface. As I have pointed out in many places, the arrangement is quite different in the Loons.\*

\* Shufeldt, R. W., "Concerning the Taxonomy of the North American Pygopodes, Based Upon Their Osteology," *Journ. Anat. and Phys.*, London, June, 1892, pp. 199-203. On page 202 it is stated, with respect to the Loons ("*Urinatoroidea*") that they possess "only a very small, flake-like sesamoid, which occurs in the tendon of the extensor femoris muscle at its

In Cormorants something entirely different from either the Grebes or the Loons obtains, and what I find to be the case I think will hold throughout the *Phalacrocoracidae*. In this family, the upper or proximal half of the cnemial process of the tibio-tarsus has, in the young, become dissociated entirely, and in the adult, as a free segment, eventually completely co-ossifies with the big true patella forming the aforesaid sesamoid, which heretofore has always been described as the patella, irrespective of the fact that its entire anterior third is represented by the proximal moiety of the cnemial process of the tibio-tarsus. In many birds the ambiens muscle has a groove for its accommodation on the anterior face of the patella, and this was probably the case in the ancestors of the Cormorants, prior to the time when, for some reason or other, the upper half of the cnemial process of the tibio-tarsus becomes dissociated and thoroughly fused with the true patella behind it. When this came about, the ambiens muscle which originally passed in a groove on the anterior face of the patella, came to pass through a foramen, which foraminal passage was formed in the manner above pointed out.

In some Cormorants this foraminal passage is extremely minute, and I believe that in such species it will be found that the ambiens muscle is gradually disappearing. This is the case in a skeleton of *P. urile* before me (No. 19,655, Coll. U.S. Nat. Mus.), where the line of union or fusion of the patella, and the dissociated upper half of the cnemial apophysis of the tibio-tarsus can be most plainly discerned. All this is still more evident in the patella of *P. auritus* ("*P. dilophus*") (No. 19,262, Coll. U.S. Nat. Mus.), where the ambiens not only goes through the foraminal passage aforesaid, but the entire dissociated cnemial apophysial portion can be made out. Indeed, the apex of the latter is distinct from the apex of the patella.

In *P. vigua* this compound patella is comparatively small, and its compound nature, as described above, very distinct, the passage for the ambiens being commodious.

In *P. carbo* (No. 18,851, Coll. U.S. Nat. Mus.) the foraminal passage for the ambiens is almost entirely absorbed in both patellæ, while the part of the cnemial apophysis which has united with the patella, as in the other Cormorants above described, is most clearly to be made out.

The foraminal passage has entirely disappeared in *P. penicillatus*, and the patella is wedge-shaped and longer longitudinally than in other Cormorants. The part of the tibio-tarsal cnemial process, which has united with it to form the big, free sesamoid, is plainly to be made out.

*P. albiventris* has the foraminal passage nearly gone—impervious in some individuals—and the bone clearly showing its composition.

insertion, and probably the true patella has co-ossified in the adult with the elongated cnemial process of the tibio-tarsus." In this matter, then, as stated above, two groups of divers are, morphologically, quite dissimilar.

In fact, while formed on the same general lines, this sesamoid, composed as described above, with and without a foraminal passage for the ambiens muscle, varies considerably (sometimes) *in form* throughout the family *Phalacrocoracidae* generally.

Returning to the skeleton of Harris's Cormorant, we may say, in regard to its *tibio-tarsus* (figs. 21, 23, Plate XIX.), that it is a very straight, stout bone, having an average length of some 140 millimeters. Such part of its cnemial process as remained with the shaft rises well about the summit of the latter, and has well-developed ento- and ecto-cnemial processes. They do not extend far down the front of the shaft, but very soon gradually emerge upon it. Chiefly posteriorly, the level summit extends considerably beyond the shaft, and presents on top extensive articular surfaces for the femoral condyles.

On the outer aspect of the straight, antero-posteriorly flattened shaft there is a very long and wide fibular ridge for the fibula, which latter closely articulates with its entire extent—some 30 mm. or more. Anteriorly there is the usual groove in the lower third for the passage of tendons, and this passes under a strong osseous bridge just above the condyles, as we find it in so many birds. Of the two massive condyles, the inner one is much lower on the shaft than the outer, and, combined, they present posteriorly an extensive articular surface for the tarso-metatarsus. A large, free *sesamoid* is found in the ligaments at the back of the inner condyle, and this is shown in fig. 23 of Plate XIX. I am inclined to think that such a sesamoid does not occur at the back of the outer condyle, as I do not find it in any of the other skeletons where the other is invariably present; most all, if not all, other Cormorants possess it (*P. urile*, &c.)

Some interesting variations are to be found in the tibio-tarsi of other species of this group of birds, as, for example, in the extinct Pallas's Cormorant, the unusually broad fibular crest has its anterior surface in the same plane with the anterior surface of the tibio-tarsal shaft, thus creating a broad, flat area of bone immediately below the cnemial processes. The tendinal canal at the lower end of the shaft is remarkably deep at its lower part, and the osseous bridge spanning it looks, to an unusual degree, upward rather than forward. Throughout the family, however, the morphology of the bone is practically the same, though the study of its variations are highly important.

In all Cormorants the *fibula* is remarkably well developed, being long and stout, especially stout opposite the fibular ridge and above, while distally, in some old birds, Harris's Cormorant not excepted, it almost reaches down to the side of the outer condyle of the tibio-tarsus, the short interval being spanned by ligament.

While the *type* of them is the same, the *tarso-metatarsi* of Cormorants likewise exhibit a considerable amount of variation—more so, perhaps, everything else being equal, than do the tibio-tarsi of those birds. In some it is stout and rather shortish; in

others it is longer and considerably more slender with respect to its shaft, and so on through the family.

*Nannopterum harrisi* possesses a rather short, very stout, straight, broad, antero-posteriorly flattened *tarso-metatarsus*, with large, prominent, distal trochlea, which lie nearly in the same plane, though the middle one is somewhat the lowest. The anterior aspect of the shaft is excavated above, which excavation imperceptibly merges on to the shaft as a shallow, longitudinal concavity, as far as the large, circular foramen below, which in life transmits the anterior tibial artery.

The outer side of the shaft is also longitudinally grooved for the passage of certain tendons to the foot. Posteriorly, the shaft is flatter, though a little less so internally, where, at its lower third, is attached by ligament the rather large *first* or *accessory metatarsal*, the enlarged distal end of which articulates with the first joint of hallux.

At the base of the excavation at the upper third of the bone in front there is to be observed the usual pair of foramina, placed closely side by side. They pierce the shaft as usual, their posterior exits being not far apart, one on either side of the large quadrate *hypotarsus*. This latter springs from the *inner* mesial aspect of the shaft above, being a large quadrate osseous lamina, finished off posteriorly by an expanded cap of bone, rounded above and pointed below, flat behind, and with its margin protruding all round—this finishing-off piece itself being at right angles to the hypotarsal plate proper (Plate XIX., fig. 23). In Harris's Cormorant it extends *below* the latter: but this is not the case in all Cormorants—such species as Pallas's, *P. urile*, and many others being exceptions to it.

Then to the *outer side* of the hypotarsal plate in *Nannopterum* we find one large *groove* for tendons, and external to it one or two very shallow, and very indefinite others. *There are no piercing foramina*, while in Pallas's Cormorant, in *P. punctatus*, and doubtless in others, one very distinct foraminal, tendinal passage passes through the hypotarsus longitudinally. This is the case also in *P. urile* and *P. auritus*.

The condylar cavities on the summit of the bone are, as we might suspect, extensive—the inner one being the larger as well as the deeper of the two, while a big, intercondylar tubercle stands between them in front. Postero-externally, the outer of these two articular areas is drawn out into a distinct apophysis, which is present in most other Cormorants.

In *pes* the joints are long and somewhat flattened from above, downwards, except in the case of the long, curved joint of *hallux*.

The *ungual joints*, though of fair size, are of a feeble pattern, as is the rule in the case of most swimmers among birds (fig. 23, Plate XIX.) All the basal joints of the anterior toes are nearly of a length, each averaging about 26 mm. from base to distal trochlea; this is more or less true of other Cormorants.

## CONCLUSIONS.

Osteologically, *Nannopterum harrisi* presents all the characters, with the usual specific variations, found in the *Phalacrocoracidae* generally. Its title to generic distinction rests entirely, in so far as its skeleton is concerned, upon those morphological changes which have taken place in its osseous and other systems, due to the gradual loss of the power of flight. In other respects it is a true Cormorant, and had it never become flightless, and the result not taken place in its structure, there would have been no occasion to remove it from the genus *Phalacrocorax*.

In that genus it sees its nearest relatives among the "long-faced," more or less compressed crania types, though not the extremes among them, as, for example, the *Urile* series. With respect to its skull as a whole, it agrees best with some individuals of *P. penicillatus*; while, upon the whole, in the remainder of its osteology, it is as near allied to *Phalacrocorax perspicillatus*—the extinct Pallas's Cormorant—as it is to any other form now existing in the world's avifauna.

## EXPLANATION OF PLATES.

(All the figures in the Plates, with the exception of Plates XVII. and XVIII. (where they are reduced about one-fourth), are of natural size,\* being reproductions of photographs made direct from the specimens by the author.)

## PLATE XV.

- Fig. 1.—Skull of adult *Nannopterum harrisi*. Direct superior view. Large occipital style in normal position. (No. 19,628, Coll. U.S. Nat. Mus.)
- Fig. 2.—Lower mandible of *N. harrisi*. Direct superior view. Belongs to the skull shown in fig. 1 above.
- Fig. 3.—Skull of Brandt's Cormorant (*Phalacrocorax penicillatus*), adult. Viewed directly from above. Mandible, quadrates, and occipital style removed. (No. 940, Coll. U.S. Nat. Mus.) The removal of the quadrates allow the zygomas to spring inward too near the mesial plane of the cranium.
- Fig. 4.—Skull of adult *N. harrisi*. Direct left lateral view, with mandible detached and occipital style in position. (No. 19,720, Coll. U.S. Nat. Mus.)
- Fig. 5.—Skull of Harris's Cormorant (*N. harrisi*). Adult. Viewed from above. Mandible and occipital style removed. (No. 19,720, Coll. U.S. Nat. Mus.)
- Fig. 6.—Skull of an adult Red-faced Cormorant (*P. urile*). Viewed directly from above, with lower mandible removed. (No. 12,505, Coll. U.S. Nat. Mus.)

## PLATE XVI.

- Fig. 7.—Dorsal view of the *sternum* of *N. harrisi*. (No. 19,720, Coll. U.S. Nat. Mus.) Skull belonging to this skeleton is shown in fig. 5, Plate XV., above:

\* Dr. Shufeldt's plates were reduced by about one-third to fit the page.

- Fig. 8.—Left *coracoid* of *N. harrisi*; anterior view. (No. 19,720, Coll. U.S. Nat. Mus.) See fig. 5, Plate XV., and fig. 7 of this plate.
- Fig. 9.—Left *scapula* of *N. harrisi*, dorsal view. (No. 19,720, Coll. U.S. Nat. Mus.) See fig. 5, Plate XV., and figs. 7 and 8 of this plate.
- Fig. 10.—Right *coracoid* of *P. carbo*; direct anterior view. (No. 18,851, Coll. U.S. Nat. Mus.)
- Fig. 11.—Right *scapula* of the Cormorant (*P. carbo*); dorsal view. (No. 18,851, Coll. U.S. Nat. Mus.) See fig. 10 above.
- Fig. 12.—First seven *cervical vertebrae* of *N. harrisi*. Direct left lateral view. Adult. (No. 19,628, Coll. U.S. Nat. Mus.) See figs. 1 and 2 of Plate XV. above.
- Fig. 13.—*Cervical vertebrae* (eighth to the fifteenth inclusive) of *N. harrisi*. Direct left lateral aspect. The leading seven are shown in fig. 12 of this plate.
- Fig. 14.—*Os furcula* of *P. carbo*. Direct posterior view. (No. 18,851, Coll. U.S. Nat. Mus.) From the same skeleton which furnished the scapula and coracoid shown above in figs. 10 and 11.
- Fig. 15.—*Os furcula* of *N. harrisi*. Direct posterior view. (No. 19,720, Coll. U.S. Nat. Mus.) See figs. 7, 8, 9, and others in the plates.

## PLATE XVII.

- Fig. 16.—*Trunk skeleton* of Harris's Cormorant (*N. harrisi*). Adult. Direct left lateral view. (No. 19,628, Coll. U.S. Nat. Mus.) See fig. 1, Plate XV., and figs. 12 and 13 of Plate XVI.
- Fig. 17.—*Trunk skeleton* of the Double-crested Cormorant (*P. auritus*). Adult. Direct left lateral view. (No. 19,262, Coll. U.S. Nat. Mus.)

## PLATE XVIII.

- Fig. 18.—*Trunk skeleton* of *P. auritus*. Ventral view. Same as shown in fig. 17 of Plate XVII. above. (No. 19,262, Coll. U.S. Nat. Mus.) Right coracoid removed.
- Fig. 19.—*Trunk skeleton* of *N. harrisi*. Ventral view; adult. Same as shown in fig. 16 of Plate XVII. above. (No. 19,628, Coll. U.S. Nat. Mus.)
- Fig. 20.—*Pelvis, four last dorsal vertebrae*, and the *skeleton of the tail* of *N. harrisi*. Adult. Viewed on direct dorsal aspect. (No. 19,720, Coll. U.S. Nat. Mus.) See various figures in Plates XV., XVI., and XVII. for other parts of the skeleton of this individual. Prominent process on the external free border of the ilium (anterior to the acetabulum) on the left side broken off, and it would further appear that the *seventh* caudal vertebra is missing.

## PLATE XIX.

- Fig. 21.—Right *tibio-tarsus, fibula*, and *patella* of *N. harrisi*. Anterior view. Adult. (No. 19,628, Coll. U.S. Nat. Mus.) See fig. 16, Plate XVII., and fig. 19, Plate XVIII.

- Fig. 22.—Right *tarso metatarsus* and *accessory metatarsal* of *N. harrisi*. Anterior view. From the same skeleton that furnished the bones seen in fig. 21.
- Fig. 23.—Left *pelvic limb* (complete) of *N. harrisi*. Internal or mesial aspect. From the same skeleton that furnished the trunk skeleton shown in figs. 16 and 19 and other bones in the plates. Note large *sesamoid* above the tarso-metatarsus.
- Fig. 24.—Right *femur* of *N. harrisi*. Anterior view. (No. 19,628, Coll. U.S. Nat. Mus.) Same skeleton as shown in part in figs. 16, 19, and other figures on the plate.
- Fig. 25.—Right *pectoral limb* of *N. harrisi*. Palmar aspect, and complete. (No. 19,628, Coll. U.S. Nat. Mus. From the same skeleton that furnished the pelvic limb figured on this plate.
- Fig. 26.—Skeleton of the left *manus*, including *carpal bones*, of *P. carbo*. Adult. Palmar aspect. (No. 18,851, Coll. U.S. Nat. Mus.) See figs. 10, 11, and 14 of Plate XVI., which are bones from the same skeleton.
- Fig. 27.—Left *humerus* of *P. carbo*. Anconal aspect. From same limb as the previous figure. (No. 18,851, Coll. U.S. Nat. Mus.)
- Fig. 28.—Left *radius* of the Cormorant (*P. carbo*). Supero-palmar surface. (No. 18,851, Coll. U.S. Nat. Mus.) See figs. 26, 27, and 29 of this plate; also figs. 10, 11, and 14 of Plate XVI.
- Fig. 29.—Left *ulna* of *P. carbo*. Supero-anconal surface. (No. 18,851, Coll. U.S. Nat. Mus.) For other bones of this skeleton see references under previous figure.

## Nesting of the Black Cormorant (*Phalacrocorax carbo*) in Tasmania.

BY (MISS) J. A. FLETCHER, R.A.O.U., SPRINGFIELD (TAS.)

MY sisters and I, some years ago, were spending the Michaelmas vacation at Bridport, which is the nearest seaport to Springfield. I had chosen this trip, being anxious to study the bird-life of the surrounding district, and also to see if Fairy Martins (*Petrochelidon ariel*), a species reported as breeding at Bridport in 1883, were present. In this I was disappointed, and also with regard to the district's bird-life, for, though much country was traversed, few interesting notes were made. Snakes, however, were numerous, and I found myself wondering what they lived upon.

I identified the Forty-spotted Pardalote (*Pardalotus quadragintus*) in some timber on the way down, and at Bridport found the haunt of a pair of Azure Kingfishers (*Alcyon azurea*). The presence of Black Cormorants (*Phalacrocorax carbo*) attracted my attention, and I observed that, in the evening, they always flew in one direction. Watching them carefully, I came to the conclusion that the birds remained in this locality for nesting.



Cormorants' Rookery.

FROM A PHOTO. BY MISS FLETCHER.



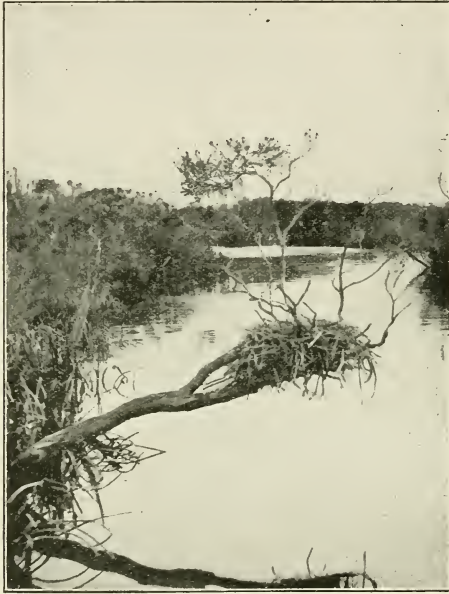
One day my sisters and I, with our bicycles, were rowed across the river and landed on the long beach which stretches 20 miles or more to Waterhouse Point. Close to where we landed were half a dozen nests of the Red-capped Dottrel (*Ægialitis ruficapilla*). We cycled for miles along the hard beach, just above the flow of the water, and an occasional extra large wave caused much merriment if one of us was not quick enough to avoid its spray. This beach was very exposed, and on the whole length travelled only one pair of birds, Hooded Dottrels (*Ægialitis monarcha*), was seen. Their nest, containing three eggs, was placed high up the beach in a sheltered depression.

We left our cycles in a protected hollow, and climbed up one of the high sand-hills to see what lay behind. The view was grand, but what interested us most was a large lagoon lying beyond the sand-hills and bounded on the other side by a curving tea-tree-fringed river. We made our way over the intervening half-mile of sand and partly buried Banksia scrub to the edge of the lagoon. A pair of Australian Pelicans (*Pelecanus conspicillatus*), many Black Swans (*Chenopsis atrata*), and several kinds of Ducks were out on its waters. Some Little Black Cormorants (*Phalacrocorax sulcirostris*) were perched on the tea-tree tops, and when they rose I noticed several Black Cormorants among them. I now felt that it was highly probable that the latter species nested somewhere among that vast region of flooded tea-tree country. It was not possible to explore the lagoon without a punt. We found a Swan's nest ready for eggs, and also saw a bird leave her nest. But the water was dark and treacherous looking, suddenly deepened, and the long floating leaves of fluke-weed were signs that wading was risky. So the Swan's nest was not examined.

It was not until the autumn of 1914 that I was able to take any further steps to find the nesting place of *P. carbo*. I talked over the possibilities with Mr. A. W. Swindells, R.A.O.U., and he and I decided to devote the Easter holidays to an exploration of the supposed Cormorant rookery. From information gained by me, we had come to the conclusion that the birds nested on the property of a gentleman who allowed no hunting or shooting on his land. However, he courteously gave me permission to explore. We left Springfield on Easter Saturday, and made Bridport our headquarters. In an interview with the owner of the land mentioned we were told that most certainly Cormorants nested along the river; also that there were two rookeries in which the Black Cormorant (*P. carbo*) nested in company with the Little Pied (*P. melanoleucus*). One rookery was easy of access; the other was some miles down the river, and was awkward to reach on account of the submerged tea-tree.

We were offered the loan of a boat if we cared to wait till Monday, and the owner also said that he would accompany us, as the entrance to the river across the lagoon was rather hard to find. Unfortunately, on Monday he was ill, but, ample instructions being given, we drove through several paddocks till we came to the

head of the race, where the boat was moored. Turning our horses loose, we scrambled into the boat and prepared for the exciting part of our trip. For three-quarters of a mile we had to pole the boat against the fairly swift-running current of the race. None of our party of four could pole, though we could manage rowing, and so the voyage up the race was rather exciting, though at times it seemed as if the current would win. However, we conquered, and with great relief the open lagoon was reached.



Black Cormorant's Nest.

FROM A PHOTO, BY MISS J. A. FLETCHER.

Through a tangle of water weeds and past stunted tea-tree and clumps of reeds and rushes we found our way into the river, which, owing to a "fresh" coming down, was flowing fairly swiftly, in spite of the fact that for many acres it overflows its banks through a region of dead and living tea-tree. At this stretch the river was 14 feet deep, and four persons in a small boat had to be very careful in movement for fear of capsizing.

Great was our delight when, after rowing a few yards up the river, we saw the large nest of the Black Cormorant standing

prominently out on a small jutting tree. By its side were two smaller nests, those of the Little Black Cormorant. In the larger nest were a few scraps of egg-shells lying amidst the sticks at the bottom. Rowing still further, we came to a rookery in which we counted several nests of *carbo* and thirty of the smaller species. We continued our exploration for nearly a mile, passing several more nests on the way, until further progress was partly blocked by fallen timber. Our boat being rather overladen and on a dangerous river, we decided to return, much to the relief of a pair of fine Black Swans, which had been swimming ahead of us. As it was long past noon, we halted opposite the main rookery, and, tying our boat to the tea-tree, ate our lunch sitting in the craft, as there was no possibility of getting out. While so doing we were charmed by the evolutions of some White-rumped Swifts (*Cypselus pacificus*) flying high above us. We started the return journey, and, after experiencing a little difficulty in finding the right opening into it, we rowed across the lagoon and entered the race. In this we were going with the current, and had only to keep the prow of the boat straight. We soon reached the landing-stage, highly pleased with our day's trip.

In September, 1914, I paid a visit of inspection. As the boat entered the river a flock of Little Black Cormorants rose from the rookery, but on looking at the nests I found that they had not been touched. Mr. Swindells and I made a trip to the rookery at the end of October, but, except for the fact that birds of the smaller species were repairing their nests, there was nothing of interest to note about the Cormorants. The season was very dry, and we concluded that this was having its effect upon the birds. Other water-birds frequenting this region were very dilatory in regard to nesting matters.

Towards the middle of November, 1914, Mr. Charles Barrett, of Melbourne, spent a few days in this district, and as I had arranged a trip to the rookery I invited him to accompany me. Visions of photographs of nests and eggs rose before our eyes, but again there was disappointment. Nothing further had been done to the smaller nests, but a Black Cormorant flew from the large one noted on my first visit, and an inspection showed that fresh sticks had been added. The sticks used by these birds were the small top twigs of dead tea-tree. In the flock of birds flying above us we noticed eight Black Cormorants. We exposed a few plates on the rookery, and so obtained some little reward for our long journey.

I made another trip about the middle of December, 1914, but with no results. An amusing incident occurred. Three partly-grown puppies belonging to my host followed the boat down the race, and swam gaily through the lagoon, but when the colder water of the river was reached the little creatures followed the boat, howling and yelping pitifully. When we reached a tea-tree clump on which were several nests, the pups were pulled out of the water and placed on these, where they sat shivering and looking very miserable. I took a photograph, for they made an excellent picture. They were permitted to return home in the boat.

In January last the rookery was again looked at, but had not been used. Thinking matters over, I came to the conclusion that the Cormorants must have been influenced either by the drought prevailing or disturbed by our visits, and probably retreated to the more distant rookery. Some of the pairs nested somewhere, for young birds were seen with the older birds in May. Weather conditions are more favourable this year, and I hope to be able to publish in a future issue of *The Emu* details and illustrations of their nests, eggs, and young.

## The Admission of Colour-Genera.

BY GREGORY M. MATHEWS, F.R.S.E., R.A.O.U., &c.

ON the 10th February, 1915, a discussion was held at the meeting of the British Ornithologists' Club under the title, "Coloration as a Factor in Family and Generic Differentiation." The meeting was memorable, as by means of it we have now on record the views of leading British ornithologists with regard to a matter much and unreasonably neglected. I allude to the differentiation of species of birds into groups which will show their natural affinities. The members of this Union will have little opportunity of studying the B.O.C. Bulletin, and only a few will see *The Ibis*, where, in the April number, a detailed account of Dr. Lowe's remarks appears. I have, therefore, thought that it would be of interest to review that meeting and also give some Australian examples relative to the subject.

Dr. Percy R. Lowe opened the discussion,\* and immediately

\*The editors, in order that readers will have a better idea of Dr. Lowe's paper, have added several footnotes, including four extracts from Dr. Lowe's paper, which opened as follows:—

"I should like to state at once that in the few remarks which I propose to make on the subject of to-night's discussion, it is no part of my plan to attempt in any way to upset the established characters and methods which are employed in generic differentiation or to substitute for these some brand-new scheme based on colour-characters. Such a proceeding would be both futile and foolish. All I wish to accentuate is this—that colour-pattern seems to be a very important feature in generic differentiation, which has been, I cannot help thinking, unnecessarily neglected, looked down upon, or ignored. I believe not only that colour-pattern furnishes, in many instances, an important clue to the phylogenetic relationships of various groups of species, but that it would, if properly applied, enable us to get a practical and working idea of the limits of genera.

"I believe, in a word, that the employment of the factor of colour-pattern in generic differentiation would act, in many instances, in the way, so to speak, of a control experiment by which we might either substantiate or correct previous estimates of generic groups which have been based on such characters as are usually employed.

"Applied in a systematic way to all the genera which exist at the present time throughout the whole class of birds, I cannot help thinking that many of these genera would be found either to include too many species or too few.

"Finally, I do not for one moment hold the view that this factor can be universally applied to all genera, or anything like all; but where it can be used with good results, I can see no possible reason why it should not be applied—and applied, moreover, without fear of laying ourselves open to the charge of mere amateurism."

made good his cause by pointing out that colour-pattern was the basis of his theme, and not mere coloration. It turned out afterward that those who had intended to oppose him had not studied the subject, but were merely going to cite cases of abnormal coloration as a reason for the rejection of colour as a generic differential character. I would explain here that colour-pattern, as opposed to mere coloration, can best be understood by the citation of an example, and that Dr. Lowe at once did by making use of the Ringed Plovers. It is interesting to see that Dr. Lowe selected as his most prominent example the group I studied and commented on in my "Birds of Australia." It is still more pleasing to have to record that, from an independent study of this group, Dr. Lowe practically confirmed all my results. I studied this group from the external features of the bird's skin—viz., bill, coloration, legs and feet structure, and egg-coloration, using all these features in conjunction. Dr. Lowe attacked them from coloration, colour-pattern, and colour of juvenile from nestling to adult. He showed that the coloration of this group practically varied very little, whether the birds lived in the Arctic or sub-Arctic or in Austral or Neozelandic climes. The coloration of nestlings varied only in shade, the pattern showing practically no change. The young were very similar, and throughout all the species a constant style of coloration was observed. As a special example of how strongly this coloration was marked, Dr. Lowe cited the following:—"One of them [practical uses of nestling coloration, &c.] was the nestling of *Elseyornis melanops*, of Australia. In almost all works this form was always included at the end of the list of species belonging to the Ringed Plover group (*Ægialitis*). The nestling specimen exhibited undoubtedly proved, once and for all, that if *melanops* was indeed a Ringed Plover, it was a very aberrant form, and one which fully deserved the generic distinction that had been bestowed upon it."

I would emphasize that Dr. Lowe's results were achieved quite independently of my own, and hence the great value of such a confirmation. Dr. Lowe then showed some nestling Ducks, indicating that *Glaucium* and *Nyroca* were abundantly distinct, though they had been lumped by Messrs. Hartert, Witherby, Jourdain, and Ticehurst in their recent "Hand-list of British Birds."\* This action in displaying the evidence before the Club has had its effect, and the above-mentioned authors now accept the separation of these two genera. If all the evidence in favour

\* Dr. Lowe said:—" . . . demonstrating to you how impossible it would seem to unite *Glaucium* and *Nyroca* under one genus, as has been recently done, or, on the other hand, to include the Ruddy Sheld-Duck in a genus (*Casarca*) distinct from *Tadorna*, since the colour-pattern characteristic of the nestling plumage of the Ruddy Sheld-Duck is identical with that of the Common Sheld-Duck." Mr. Mathews not only recognized *Casarca* and *Tadorna*, but he divided *Radjah* from *Tadorna* ("Birds of Australia," vol. iv., p. 73), thus making three genera where Dr. Lowe would make one.—EDS.

of generic differentiation were as faithfully adjudicated upon there would be few genus-lumpers left. I would digress here to explain my own position, and would quote what I said at this meeting:—"I am compelled to side with those who maintain that colour must be utilized in the differentiation of generic groups, and am confident that this view will latterly prevail universally. I say this with confidence, as I was first influenced by the view of the professed adherents of the so-called 'structural' school, and my first 'List of the Birds of Australia' was prepared with that view as my basis. During its preparation I was being continually impressed with the inadequacy of the structure of a bird as a clue to its generic affinity, and, later, a monographic study of the Petrels compelled the rejection of that fallacy, as I soon realized that even in the mind of those who counselled the usage of structural characters *alone* colour was often the chief factor consulted. Study of colour evolution from the nestling to the adult, and the recognition of colour-genera, would certainly obviate many anomalies in the Australian avifauna, as is to be found, for instance, in the genus *Pachycephala* of authors, if it did not altogether prevent them. The latter result would be achieved if careful study of the birds was undertaken, and attempts to group them by means of colour were made at the time of the introduction into the genus of each new form. It should always be remembered that the available 'structural' parts of a bird-skin are, comparatively speaking, trivial and unreliable, as these are more liable to variation by wear and tear than is the colour-pattern of the feathering of a bird."

It will be remembered that I once wrote strongly upon the subject of "genus lumping," and my conversion is simply due to detailed study of various groups. I will hereafter give *Pachycephala* as an example, but would note that, without restriction by means of colour, this genus covers the most peculiar assortment of forms, and anything from the Austral-Malayan region may be here referred with a certain degree of surety. Members of *Pachycephala*, *sensu lat.*, now figure in *distinct families*, widely separated.

To revert to Dr. Lowe's statements, he showed:—"We find that certain distinctive colour-schemes are characteristic and proper to certain families or genera of birds, quite irrespective of the fact that such groups of birds are exposed to *precisely similar environment.*" This is evident when we examine any collection made in any locality where varied colours are met with. Many of these coloured birds seem to show designs with no useful purpose—*i.e.*, greenish Honey-eaters might be supposed to be protectively coloured and brownish ground-birds be similarly situated; but how does the brilliant coloration of the Superb Warbler\* help it? Such studies can be carried out by any Australian ornithologist, and the results of careful observation would

\* The bright colours of the male Superb Warblers are usually explained by Darwin's theory of sexual selection. They are generally seen close to cover.—EDS.

really be as useful, if not more so, than simple records of the bird inhabitants of, and visitors to, a place, or egg-collecting. I do not wish to belittle either, as both are most necessary for the advancement of ornithological study, but there are many other lines which are at present neglected. Thus, study of the habits of birds in the bush, their actions and methods of living, would be most valuable. I have suggested that ecological study of bird-life will later become popular, and once again advocate its study. Dr. Lowe's essay, if it had done nothing else, must have impressed upon British ornithologists the value of the study of nestlings. However the older school may view this subject, the younger British school is taking a great interest in it, and if Australian ornithologists wish to lead the van, here as in other places, they would be well advised to begin in this direction at once. I would again divert to point out that, though Dr. Lowe did not introduce into this essay any remarks *re* egg-coloration, I believe that he has been confirmed as to their value in the order *Charadriiformes* exactly as I was, and here an Australian, Mr. A. J. Campbell,\* furnished a valuable contribution, which I have previously acknowledged as being of practical use in generic differentiation. I am certain practical observations on nestlings by Australians would prove as valuable.

Many of Dr. Lowe's examples are so foreign to Australians that I forbear quotation, but when I deal with *Pachycephala* I will make reference to Dr. Lowe's remarks. His essay, as it appears in *The Ibis*,† is divided into eight heads, which I will cite:—

1. *The distinction which must be made between "colour-pattern" and mere coloration.*

I have already pointed out that this practically killed all discussion, as the difference was unknown to non-students of *colour-pattern*,‡ and the remarks made by each member emphasized this, as will be later noted.

2. *The question of concealing coloration.*

Dr. Lowe remarked that this theory has been much overworked, and made a good case for only considering it as of secondary importance. He quoted a good instance, and I feel

\* *Emu*, vol. iii., pp. 168-171.

† April, 1915, pp. 320-346.

‡ Dr. Lowe explained the difference as follows:—"Colour-pattern (that is to say, a certain definite and more or less constant relation of colour-factors to certain definite areas of the contour-plumage, occurring through a series of species or genera) implies something of a deeper import than mere coloration—something which from its constancy and persistency, its independence of mere environmental or climatic influences, and its correlation with faunal or geographic areas appears to undoubtedly suggest the influence of the germ-plasm. If this is so, it obviously follows that the factor of colour pattern must be of genetic importance. It is heritable. It ought to be, as I believe in many cases it is, a useful phylogenetic guide or clue. Mere coloration, on the other hand, may, I suggest, be regarded as somewhat akin to mere homoplastic variations or convergent adaptations in the deeper realms of morphology. Regarded in this sense, mere coloration of this kind is of no genetic value."

certain Australian Parrots would show similarity, thus:—"The Trogon peculiar to Cuba, for instance, is in reality a very conspicuously-coloured bird; yet I have found it at times very difficult to find in the forests, although I happened to know that I was within a few yards of one from having heard its peculiar Pheasant-like cry. The reason for this was that the brilliant scarlet of its under parts was apparently confused with the scarlet inflorescence of certain arboreal and parasitic plants which were common. The Trogon had, in fact, unconsciously 'adapted itself' to its scarlet-tinted surroundings; for it is to me quite an unthinkable proposition to suppose that these scarlet-coloured epiphytes could by any conceivable means have so affected the germ-cells of these Trogons that they were induced to respond in sympathy with their environment. Yet this is exactly what we are often asked to believe. On the contrary, the germ-cell produced the scarlet area, and the Trogon has made, so to speak, the best of a bad job."

Dr. Lowe's view seems very acceptable, and Australians might investigate the habitats of some of the highly-coloured Parrots,\* Superb Warblers, Sanguineous Honey-eater, &c. The result of such studies would be well worthy of publication, and no "slaughter" of bird-life is required at all in such pursuits.

3. *The constancy and persistence of colour-pattern.*

Dr. Lowe's examples were Ringed Plovers, East Indian Cuckoos, and South American Caciques. My example of *Pachycephala* will show this well.

4. *The correlation of colour-pattern with geographical or faunal areas.*

Dr. Lowe cited the genus *Cæreba*, which he had previously thoroughly studied, and then added examples I have already commented upon, the Stone-Curlews, and Oyster-catchers. Here again Dr. Lowe showed nestlings, while I laid stress upon adult coloration. The fact that the adults were so similarly coloured, while in the former case structural differences had been evolved, was not noticed by Dr. Lowe, so that here again we have strong confirmation by independent workers, *when such deal with a subject without prejudice*. For the bane of British ornithology for the last thirty years has been prejudice. This is clearly seen from the writings alone of British workers, and now such prejudice is being overcome, and I anticipate better work in the next thirty years.†

5. *The correlation of colour-pattern to sex.*

The fact that the male is often more brightly coloured than the female was put forward as a difficulty which lessens the value

\* At the R.A.O.U. Warunda camp-out, Eyre Peninsula, South Australia, in 1909, the Blue Mountain Parrots, "noble birds, gorgeously apparelled," keenly and noisily resented our curiosity, and screeched much as we tried to discover them amongst the green foliage. Though so gaudy, they were picked out with difficulty."—"An Australian Bird Book," 1911, p. 90.

† Mr. Mathews is alone responsible for personal opinions expressed in different parts of this paper.—EDS.

of colour-pattern. I will deal with this under my example *Pachycephala*.

6. *The correlation of colour-pattern with other generic characters.*

Dr. Lowe stated that this was self-evident from an examination of any group, and I would endorse this.

7. *Colour-pattern as a phylogenetic clue.*

Dr. Lowe here showed a diagram of an attempt to indicate the phylogenetic relationships of the whole group of Waders.\* This diagram was based upon a study of the nestlings, using colour-pattern, as shown by those, as a main feature, and proved conclusively that study of the nestling absolutely disposed of many debatable points in former classifications when such were not made use of. Dr. Lowe made the following most interesting announcement:—"In attempting to construct this 'family tree,' which purports to depict the phylogenetic relationships of the whole sub-order of Waders, a study of the osteological characters of this group has been carried on simultaneously with a study of the nestling young (not to mention other aids to classification), the result being that these two aids to the whole question of phylogeny have illuminated one another in the most interesting way." I now await the publication of his essay, which will be the most complete on these birds yet made, and I believe, from conversations with Dr. Lowe, that my conclusions in the "Birds of Australia," which emanated from the study of Austral forms only, will be mainly upheld by a complete monographic study of the whole group.

8. *The relationship of colour-pattern to the question of genera-splitting or genera-lumping.*

Under this heading Dr. Lowe initiated a movement quite novel to British ornithologists, but which I have indicated as being the next to be approached—viz., the usage of "super-genera." His remarks very nearly coincide with my actions, and I hope to utilize super-genera in the future when nestlings and series are available to indicate such correctly. My example of *Pachycephala* will show why the proposal of super-genera must be withheld for a while yet.

Dr. Lowe's remarks are worthy of reproduction *in toto*,† but I must content myself with his concluding sentences:—

"The obvious or logical conclusion, therefore, is that we ought more often to make use of super-genera by way of expressing or

\* Unfortunately, Dr. Lowe's valuable and interesting article in *The Ibis* does not contain the diagrams or any summary of his results.—Eds.

† The following passages regarding "monotypic" genera are especially worthy of consideration:—"As things are now, in by far the larger number of cases, genera are purely artificial, arbitrary, and non-natural ‡ groups which have been constructed for our convenience. They have, in fact,

‡ In the discussion which followed the reading of this paper, much was made of the idea that genera were non-natural, man-made, and purely convenient groups. If, however, the units (species) of which genera are composed are natural, nature-made units, surely groups comprised of such units ought to be natural if only such units are properly assorted. If genera are not natural (and there is no question that many of them are not), that is the fault of those who created them—not Nature's. Personally I believe in groups of species which are generally allied—that is to say, I believe that Mr. Iredale struck the right note when he said that genera were or ought to be as natural as species. (Author's footnote.)

emphasizing the near phylogenetic relationships of groups of genera. That any real progress in this direction is retarded or rendered practically impossible is due to the fact that at present it is only on very rare occasions, and quite sporadically, that we find nestlings or immature examples of species represented in our collections. Finally, if colour-pattern is going to be applied as a generic factor on anything like a large scale, it will, I am afraid, be found necessary to create many more genera or sub-genera than exist now. But why not, if and so long as these genera or sub-genera were found to be natural groups, corresponding, as I have found in many instances they do, with faunal areas or geographical regions or sub-regions; and if and so long as such sub-genera or genera are integrated into large natural groups, generic phyla, or whatever term is employed, so that we may be aware of their natural relationships? These minor groups of birds are not like stamps, which are to be arranged methodically in an album. We have not finished with them when we have cleverly elaborated a system which ensures that we shall know exactly where to find them in the cabinets of a museum. On the contrary, they are natural groups of organic creations, with independent or particular areas of distribution, and doubtless with independent ecological life-stories."

been constructed in order to simplify and codify our general concept of any particular family of birds. Unfortunately, unless we simultaneously employ some method of integrating minor generic groups into larger and naturally constructed super-generic phyla, there seems to be a danger that, in the multiplication of genera which is now going on, our concept will be—not simplified, but complicated and obscured. For all practical purposes, we shall, in fact, have arrived by a laborious and painstaking process at the exact position from which we originally set forth. We shall indeed have been perambulating a circle; for we have only got to imagine the process of genera-splitting carried a few more steps further on and we shall have arrived at such a pass that all genera will have become *monotypic*. This may seem to be an exaggerated picture of the position, but if colour-pattern is really and truthfully ignored in generic classification—as systematists assure us—a flood of monotypic\* and quite artificial genera is not an unlikely eventuality, so fine are the distinctions now drawn between trivial variations in the structure of the bill and other organs. If, on the other hand, colour-pattern is not ignored, genera-splitting is far less likely to do harm, and indeed is likely to be productive of much good, for we shall have got down to small groups of natural and genetically related species. These minor generic groups would, in fact, in most cases be found to consist of analytical varieties grouped around some central or dominant specific type. They would be really natural units which, when integrated with others into larger and still natural groups (super-genera or what not), would express at a glance the phylogenetic natural relationships of the particular family or sub-family we were dealing with. My point, therefore, is that, while disintegrating within justifiable and natural limits, we should at the same time integrate on the above lines. Take, for example, the Redshank association again. In this group, so variable are the structural features of the bill and other anatomical features, that almost every species could conceivably be made the type of a distinct genus; and the same might be said of the Dunlin association. Colour-pattern saves the situation."†

\* At least three-quarters of Mr. Mathews' genera of Australian birds are at present *monotypic*. —EDS.

† Mr. Mathews' 1913 list shows 50 species of the Wader order, divided into 46 genera. Forty-two of these contain one Australian species each, and four contain two species each. The B.O.U. list contains 64 species in 31 genera. Dr. Lowe's numbers are, unfortunately, not available here.—EDS.

I agree exactly with the preceding remarks, as will be well known to readers of my "Birds of Australia" and those who have watched the evolution of my "List of the Birds of Australia."

I will now give details of the discussion. Mr. W. P. Pycraft had been cited as opposing Dr. Lowe, as it was through a criticism made by him that the evening discussion was initiated. However, he at once repudiated his writings by stating, "In the main I agree with Dr. Lowe," and confirmed this with the following admission:—"A little time ago I had occasion to write part of a book on British birds, and I had to write hurriedly. As a consequence, in the concluding chapters, wherein I summed up my remarks on classification, I find I did not express myself at sufficient length to carry exactly the meaning I had intended to convey. I stated there that it was impossible, without juggling with facts, to recognize the genus *Ægialitis*, which should be included in the genus *Charadrius*, and, further, that colour was a factor which must be ignored when forming genera, if classification was to be framed on sound scientific lines." He followed up his conversion with the further illuminating remarks:—"I certainly agree that coloration is an extremely important factor in classification, and one that has been far too much neglected." Of course, this contradiction of his former written attitude practically annulled all discussion, as he was supposed to have facts to support his statements, whereas he absolutely abandoned any opposition. He then remarked how the changes from winter to summer plumage and the differences between male and female complicated the usage of colour, at once showing that he had not grasped Dr. Lowe's distinction between mere coloration and colour-pattern.

Mr. Pycraft also confirmed Dr. Lowe's essay by stating:—"If . . . . our classification is to express the genetic relationship between different groups, then we have to follow sometimes colour, sometimes some other character." His remarks about coloration throughout showed that he altogether confused coloration and colour-pattern, and, in view of his frank admission that his statement that colour must be ignored in the formation of genera was absolutely wrong, little notice may be taken of his further statements. He said, later, that "More interest must be taken in the deeper characters; first of all must come the skeleton, as being perhaps the most tangible part you can get. The characters furnished by this should form the basis of the larger groups and families, and the generic groups should rest on the same basis. . . . All the earlier naturalists placed the Owls with the Birds of Prey. But an investigation into their anatomy has shown that the Owls have nothing whatever to do with the Birds of Prey."

Pycraft himself wrote (*Proc. Zool. Soc. Lond.*, 1902, pp. 3, 4) —"On osteological evidence alone, however, it is doubtful whether the *Striges* would ever have been separated from the *Accipitres*." Consequently, the skeleton is not such a sure guide as is suggested

in the above remarks. While it is impossible to utilize skeletal characters as of generic value as a general rule, in some cases genera show differences in the skeleton. In the majority of cases, however, no tangible difference can be seen in the skeletons of admitted closely-allied genera, while in the Passerine groups even families are not well individualized as regards the skeleton.

The Hon. W. L. (now Lord) Rothschild began:—"Personally, I am not entirely in sympathy with either Dr. Lowe or Mr. Pycraft. However, if I may be permitted to say so, I cannot agree that the question of genera is of such importance from the point of view of ornithology as many of us would make out. I quite admit that species as we see them to-day are the work of evolution and of Nature, but the idea of genera is a purely human invention. . . . The classification ought to be carried out, as far as possible, on phylogenetic and evolutionary lines, as suggested by Mr. Pycraft, but I think genera ought to be subordinated to usefulness. . . ."

Herein are well expressed the views of a clever ornithologist, who has never studied higher classification, because, if species are the work of Nature, all the higher groups must be, and genera must be more than, a "purely human invention." If this were admitted, why should not colour be more commonly used, as colour-genera would be easily manipulated if they were simply constituted by means of colour without reference to form. If classification is to be carried out on phylogenetic lines, how can genera be best gauged as to their usefulness? Simply by the way they show phylogenetic alliances, and this is admitted to be governed in many cases by colour-pattern.

Mr. Ogilvie-Grant confirmed this view by his remarks:—"Genera, as we all know, are purely arbitrary divisions, which we use in grouping together allied species and sub-species, so that we may be able to deal with them more conveniently in classification. . . . Genera do not exist in Nature. . . . The deeper-seated characters should be reserved for the differentiation of families and sub-families, not genera, and should be used to link up and associate the latter in a natural manner. In this respect I think Mr. Pycraft has somewhat confused the issue." Though he deliberately stated that "genera do not exist in Nature," he argued that "Linnets and Goldfinches appear to me to be clearly-defined and natural genera"—two remarks clearly showing the confusion in his mind as to what were genera. His method may be gauged by his statement—"The more experience we have in dealing with the class Aves generally the better we shall be able to decide *instinctively* what constitutes a genus." The italics are mine. I do not think "instinct" can be resorted to for classification, notwithstanding the high authority of Mr. Ogilvie-Grant.

Mr. W. L. Sclater's views were of most value, as they really cover all that can be said save the idea that genera are purely artificial. Thus:—"I think genera are a matter of convenience

more than anything else, and a genus is entirely a human conception, and does not exist in Nature at all; it is purely artificial. We can probably define a species and a sub-species, but a genus is merely a number of species put together for our own convenience. As regards Dr. Lowe's views that generic characters should be based on colour-pattern, I must say I agree with him. I think colour-pattern is often a very ancient and deep-seated character, and obviously colour-pattern must be a much more primitive character than the relative lengths of the tarsus and the middle toe, or the relative width and length of the bill. These characters are easily modified by external circumstances, and you cannot regard these characters as more deep-seated than colour-pattern."

Dr. Hartert stated:—"I did not intend to take part in this discussion, but it interests me so much that I cannot help saying a few words. I am very glad, and must express my great satisfaction, that the general trend seems to my own view—*i.e.*, that genera are artificially made by ornithologists, and that Nature does not classify its species into genera. Nature made species and sub-species; genera are made by man for convenience. I agree, on the whole, with Mr. Pycraft, that the more 'deep-seated' characters should be taken to distinguish genera." He continued by citing examples of similar coloration in different groups as a reason for opposing the usage of colour-pattern, but he so absolutely confused mere coloration with colour-pattern that his citations do not correlate with the facts—*i.e.*, "The weakness of colour-pattern as a generic character is also shown by the different coloration of adult and young in ever so many instances, where we have the young birds quite differently marked from the adults." To any student of evolution it is well known that the young show the primitive coloration and colour-pattern; that the process of evolution can be seen to some extent by the change from the immature to the adult, and commonly from the adult female to the adult male, which is generally the most highly coloured and ornamented. The fact that adults differ in coloration does not negative the value of colour-pattern, but emphasizes it, as I hope to show later. As Dr. Hartert is strongly opposed to the recognition of colour, while all the previous speakers had admitted it, his satisfaction must be confined to the artificiality of genera as above quoted. I, however, can never understand that argument, for, if genera are purely artificial, why argue about the use of coloration in discriminating such? An artificial classification would surely grasp colour as being a most suitable means of differentiation, and then use structure when the colours became confusing.

The further speakers at the meeting were all in favour of the usage of colour-pattern, and it was practically a unanimous victory in favour of Dr. Lowe. Those who had ventured to oppose his well-considered essay mostly showed their ignorance of the higher conceptions of the subject.

I have stated I would cite *Pachycephala* as a good subject, close at hand to Australians, whereby most of Dr. Lowe's points could be brought directly into review. This typically Australian "genus" extends over New Guinea, the Moluccan Islands, eastward to Fiji, New Caledonia, but not New Zealand. We have here a "genus" with a defined geographical range agreeing with boundaries limited through the result of studies in other branches of science, including botany and geology. It is a Passerine genus, therefore one which, from the evolutionist view-point, would be a most difficult one to limit by means of colour-pattern. Yet we see a peculiar type of coloration evident in a most decided manner, and here we also see a colour-pattern which is not governed by any one colour, but is present when the colours are re-arranged and altered, and this is where the distinction between colour-pattern and mere coloration is emphasized.

Collect together male, female, and immature of *Pachycephala temporalis*, *rufiventris*, *gilbertii*, *lanioides*, and *olivacea*. We will, for the time, ignore all structural differences, and glance at these from the point of coloration alone. All the young and the females have a similar appearance, varying in particular coloration. The males, however, are somewhat strikingly different, but each shows a more or less distinct throat patch. In *olivacea* the throat is indistinctly marked as a whitish patch, freckled with brown, rather agreeing with the general throat coloration of the females of all the species. In general hue, the male in this species agrees with the female, and from an evolutionary view-point this would be suggested as the oldest form, the one in which the male retained the dull plumage of the female and immature. Peculiarly enough, the Norfolk Island form has done the same thing in an even more marked manner, as it has scarcely varied at all from the universal female type, whereas *olivacea* does show a variation. Now, while the female of *temporalis* is content to retain the original plumage, the male has evolved a gorgeous green, yellow, and black coloration. The head is black, as is a broad pectoral band enclosing a pure white throat, while the rest of the underneath parts is bright yellow, this colour also forming a nuchal collar; the back is olive, the wings and tail blackish. I will revert to the forms of this shortly. When we pick up the male of *rufiventris* we see exactly the same colour-pattern,\* but with no colour the same save the head, throat, and pectoral collar; the under parts are pale reddish-brown, while the upper are grey. The species known as *gilbertii* does not show the black pectoral collar, but has the throat red, followed by a greyish band, and the grey abdomen tinged with rufous. It is grey above. The rare bird *lanioides* has the white throat surrounded by a black band, the under surface white, and the head black.

\* As the "colour-pattern" is "exactly the same," how does Mr. Mathews justify his placing these two species in two genera of one species each? Mathews' 1913 list places seven Australian species of *Pachycephala* (used in its restricted sense) in seven "monotypic genera."—EDS.

Now, though so different in coloration, there is a determinate family resemblance in the colour-pattern of all these birds, and that peculiar white or coloured throat patch is remarkably constant. Since we see here a variation in coloration from *olivacea* to *temporalis*, with apparently little structural alteration, the genus-lumpers used this group as a dumping-ground for any Austral species, and, as recognized now by Rothschild and Hartert, the genus is heterogeneous and polyphyletic, and birds properly referable to other families have been classed here. The migration backwards and forwards of *Eopsaltria* and the species referred to it will be familiar to my readers. Dr. Lowe quoted another instance. One bird referred to *Pacilodryas* has been transferred to *Saxicola*, while another proves to be the female of a form of *Pachycephala* \* *temporalis*. He suggests study of colour-pattern indicated these emendations.

Dr. Hartert referred another bird to *Pachycephala*, which Dr. Ramsay described as an *Eopsaltria* (?), from its colour-pattern. I concluded it could not be classed in either, and Dr. Macgillivray, from a study of the living bird, endorsed my conclusion. The persistence of the colour-pattern is evidenced by the cases of *P. temporalis* and *rufiventris*, where a distinct coloration is seen combined with an identical colour-pattern. There is an extra-limital group about *P. kebirensis*, Meyer, from Roma Island, Moluccas, which has also retained exactly the colour-pattern, but is a grey bird with white underneath instead of yellow or reddish.

As noted above, we are dealing now with a group high in the scale of evolution, and one showing quick changes both in male, female, and young. The fact, then, that a well-marked colour-pattern can be seen through so many changes is very remarkable, and the birds coloured like *P. temporalis* can be cited as furnishing a most thoughtful group. The variation of *P. temporalis* throughout Australia has been expressed by the description of many sub-specific forms, but the change in coloration is comparatively slight, being most easily seen in the tail coloration. The shades in the female coloration, however, can be distinguished in some cases. Outside Australia, however, as the birds were isolated completely and different environmental stresses came into play, some new changes appear. A number show as little change in the male coloration as do the Australian forms, but the female shows proportionately a greater change. In New Caledonia, however, the female begins to evolve a male style of coloration, and in *P. littayei*, while the male agrees closely with that of *P. temporalis*, the female underneath has a pure white throat, followed by yellow, thus differing from the male in lacking the black pectoral collar. She has, however, not evolved a black head either.

As a variation away from the *temporalis*, we find *mentalis* in

\* Dr. Lowe refers *Pachycephala* to the Shrike family, *Laniidæ*. Mr. Mathews and the R.A.O.U. refer it to the Flycatcher family, *Muscicapidæ*.

Ternate attaining a black chin, and in Tonga we see a most complex change, the throat in the male being all black, the rest of the under parts being yellow, the place of the black pectoral band being yellow; in the female the throat is white, a rusty-tinged pectoral band being followed by yellow underneath. In *P. astrolabei*, from the Solomon Islands, the male is practically as in *temporalis*, but the throat coloration is *bright yellow*, not white. On another of the Solomon group, a further melanistic change occurs; the birds called *P. melanota* have the black of the head extending over the whole of the upper parts, and the pectoral band broadened, and black patches appearing on the sides of the body. In the former the female shows a tendency to evolve into a yellowish underneath bird, which has come about in the latter, which has also evolved in a reddish direction on the head, wings, and pectoral band. On the Fiji Islands there is a form which has lost the black pectoral band while producing a yellow throat, and is now uniform yellow below, and, in addition, has evolved two yellow forehead spots. I would just like to note that another form, called *P. fulviventris*, while retaining the general colour-pattern, with a white throat, has produced a deep fulvous abdomen, &c., coloration.

This review may not be so easy to follow as it is when the birds are laid out for examination, but the existence of a definite colour-pattern in this group independent of colour is manifest by the existence side by side of *P. temporalis* and *rufiventris*. How the colours change in a complementary manner has been explained in the preceding cases, when we see the yellow predominating, the black predominating, and the fulvous new colour driving out the yellow. We have not the changes in existence as far as is yet known showing the alteration from *temporalis* to *rufiventris*.

It must be obvious now that there is a difference between coloration and colour-pattern as laid down by Dr. Lowe in section 1. The constancy of persistence of colour-pattern (Dr. Lowe's section 3) has been well demonstrated. The correlation of colour-pattern to sex (Dr. Lowe's section 5) must be recognized throughout the preceding remarks on *Pachycephala*, and the student will have noted how the colour-pattern is even evolved in the female in the case of *P. littayei*. The usage of super-genera must await the examination of suites of material, as here, apparently, we have a super-generic group of birds, which includes several generic groups which have not yet been determined.

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**An American Opinion Concerning Genera.**—The following passage, taken from *The Auk* (the official publication of the American Ornithologists' Union), July, 1915, shows American thought concerning the difficult question of genera:—

“The question of the limits of genera bids fair to be the most serious problem in zoological nomenclature. In the recent ‘List of British Birds’ there are 171 species and 151 generic groups

which are to be found also in the A.O.U. Check-list. The two committees working under the International Code have, after making allowance for several admitted errors or arbitrary violations of rules, arrived at the same names for all but four of the species, while the latest British list differs from that of Dr. Hartert and his associates in only three specific cases. When three independent committees approach so close to uniformity it would seem that the International Code had solved the problems of nomenclatural discrepancy.

"In the case of the 151 genera, however, we find 49 cases where the names employed are different. After making allowance as above, we find that only 7 of this number are due to questions of nomenclature—*i.e.*, to the still unsettled point as to how much difference in spelling constitutes a different word, and to the recognition of certain works in systematic nomenclature.

"The other 42 cases are due to difference of opinion as to the limitation of genera. One committee, for instance, considers that the Mallard, Blue-winged and Green-winged Teal each represents a distinct genus, and consequently calls them *Anas brachyrhynchos*, *Querquedula discors*, and *Nettion carolinense*. Another considers that they all belong to one genus, and quotes them as *Anas brachyrhynchos*, *Anas discors*, and *Anas carolinensis*. The third regards the Teal as congeneric, but considers that the Mallard represents a distinct genus, and we have *Anas brachyrhynchos*, *Querquedula discors*, and *Querquedula carolinensis*. It will be noticed that there is here just as much confusion and difference of opinion as could possibly be occasioned by the law of priority, the 'first species' rule of type fixation, or any of the other principles of nomenclature against which such protests have been directed; and yet this is due purely to a question of ornithology with which the rules of nomenclature and the 'name jugglers' have nothing whatever to do.

"Now, if the name of a bird is to be used as a medium to exploit personal opinions as to the phylogeny and relationship of species we had better devise some other means of tagging a species so that someone else will know what we are talking about.

"If, on the other hand, the name of the bird is to constitute such a 'tag,' then we should by some international and arbitrary agreement decide these disputed cases, so that we may have the same uniformity *ornithologically* that we seem to have at last attained *nomenclaturally*.

"The great majority of ornithologists are pretty well agreed upon the great majority of genera, and there will not be so very many to be settled arbitrarily, but such arbitrary action, if we are to have a permanent and universal system of names, seems to be inevitable. Those who wish to make further subdivisions may still use the suppressed names as sub-genera in any discussion or systematic monograph.

"Another phase of the same question is the increasing tendency to recognize finer and finer generic divisions, a matter which has

been discussed by the writer (*Jour. Acad. Nat. Sci. Phila.*, xv., p. 313) and by the British Ornithologists' Club at a recent meeting (*Bull. B.O.C.*, No. 204, p. 68 *et seq.*) In some groups we have already reached the stage where a large number of genera contain but a single species each. The generic name has thus become of exactly the same significance as the specific name, and is superfluous. The ultimate outcome of this sort of thing will be a nomenclature wherein each species will have a name but no clue whatever to its relationship will be found in this name.

"Linnæus's idea was that the 63 genera under which he arranged all the birds known to him represented 63 types of bird structure, and when the generic name was mentioned the general character of the bird was immediately known, while the specific name indicated a form of that type of bird.

"Of course, we cannot go back to Linnæus, or anywhere near to him, but we *must*, if a name is to be maintained as a name, check the further subdivision of genera. Moreover, why is the discovery of a slight structural difference of such paramount importance that we should overturn our names to advertise it? Is it not just as important to emphasize relationship as divergence? Indeed, we are suffering at the present time in systematic ornithology for the need of some way to indicate relationship. We shall soon be forced to erect a lot of sub-families to indicate relationships formerly denoted by generic names which have now been degraded until they are perilously close to species.

"It should be borne in mind that a genus is not a definite thing in the sense that a species is; it is simply a group for convenience—sometimes it is sharply defined, more often it is not. This fact is well shown in the virtual agreement of the committees referred to above as to the number of species before them and their wide differences of opinion as to the number of genera.

"It is difficult to provide a means for bringing about the desired uniformity in the limits and number of generic groups, but the necessity for such action should be strongly emphasized and widely proclaimed."

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## Observations on the Nankeen Night-Heron (*Nycticorax caledonicus*).

BY S. A. HANSCOMBE, SEAHAM (N.S.W.)

IN the swampy regions of the Port Stephens district (N.S.W.), extending from West Maitland and Newcastle north as far as Bulladellah, many Nankeen Night-Herons (*Nycticorax caledonicus*) are to be found. I have for three years lived in this remarkable district, the home of numerous water-fowl. Unfortunately, many gunners—I cannot in all cases say sportsmen—annually visit a number of the isolated swamps and ruthlessly shoot birds—not game birds, but anything with feathers. Night-Herons, at times,

seem to be killed in large numbers. Retiring as they mostly do to Cabbage-tree Island, to nest and breed in great colonies during November and December, many of the birds and their young fall an easy prey to ruthless bands of Christmas holiday makers. I sincerely hope that the R.A.O.U. will, at an early date, pay a visit to this region. Members would, I think, then be convinced of the advantages of having these extensive waste swamp lands declared sanctuary. The enormous tracts here that will not for generations be drained or used for agriculture would then be a fine national possession, as the home of water-fowl and other animals. Legitimate sportsmen also would doubtless approve of such protection being afforded rapidly disappearing species.

On visiting the locality on the first occasion I was surprised at the docility and habits of the Nankeen Night-Herons on properties where shooting was prohibited. The impression that the birds were nocturnal, and slept by day in some shady clump of trees overhanging the water, was soon altered. Reflecting that local circumstances or some strange weather conditions accounted for a temporary deviation from ordinary ways, led me to make a series of observations extending over two years. One naturally hesitates to question the observations of eminent authorities, and in venturing to do so I am not moved by merely a desire to criticise, but rather to induce a more detailed study of these strange and interesting birds. Nankeen Night-Herons are certainly not nocturnal in the same sense as the Owls and Frogmouths. During certain portions of the year, the Night-Herons can be said to be nocturnal, when living in colonies, but when congregated only in limited numbers, and undisturbed, they are usually diurnal.

It is to a pair of Nankeen Night-Herons that I will chiefly confine my remarks for the time being. Their period of activity—that is, of food-hunting—usually began at or about mid-day, and they worked incessantly till dusk. Their presence was still indicated by their noises till near midnight. Though their particular swamp was entirely surrounded by tea-tree or “paper-tree,” with very thick foliage, their resting-place was not near the swamp. After weeks of search I located the friendly clump of turpentine and eucalypts that provided the place of camp. This was on a hill-top, at least half a mile from the swamp, and here the birds could be found daily till about 10 a.m. They were regular in their hours until the approach of winter. About the beginning of April they became daily later, and by May would appear to have again become strictly nocturnal. These changed conditions prevailed then till the advent of spring, and by September the birds would resume their partly diurnal and partly nocturnal habits. So tame were they that I had full opportunities of observing them. In the first season two young birds were reared, but detailed observations were now broken by a band of gunners, who shot several of the birds. The others, probably wounded, were never afterwards recognized. However, the season 1914, with its prolific rains, brought great numbers of

Nankeen Night-Herons to the swamps of Seaham. They offered greater facilities for observations. During any hour of the day, from 10 a.m. till dusk, numbers could be observed catching fish, crickets, yabbies, and so forth, in the swamps. Upon one occasion, in January, when the thermometer in the shade registered 102 degrees at noon, some of the birds were at work. Even most diurnal birds at that hour are resting. The majority of the flock, however, was at that time half a mile distant, on a hill-top among the shady tops of tall eucalypts. After the opening of the new year gunners were plentiful, and the flock retired to the thick forests and scrubs further back. Here a discreet observer could see the birds feeding among the vine-tops and along the blackberry bushes at all hours of the day. Apparently they were eating the insects that the vines supported. By this time the birds had become very timid, and all observations had to be made by stealth. The least noise, and away the Herons would fly, always well above the tree-tops. Fortunately for themselves, after a few disturbances they usually fly too high for gunners. On the other hand, on protected areas they are exceptionally tame and trustful.

I cannot at present say with certainty the number of broods that a pair of Herons rears each year. One pair certainly had two broods—one in the spring and the other in early summer. In the great Heronry at Cabbage-tree Island the birds form big colonies in early summer. I saw large numbers of Herons in the mangroves along the banks of the Hunter River, but, as they appeared around Seaham in numbers during December, nesting had evidently ceased for the year. Not the least interesting features about these birds are the crest, and the varied stages preceding adult plumage. The colour of the legs seems to vary a great deal, ranging from yellow to pale green. It is doubtful whether the adult plumage is assumed before the third year. Nankeen Night-Herons, being heavy birds, often signalize their flight by the cracking of the dead limbs on which they perch. This is particularly the case with the young birds. When in their second year the birds assume some of the cinnamon tinge, but can still be readily distinguished, except when in flight overhead.

The nests of the Nankeen Night-Herons are not artistic structures. They are found in great rookeries, as at Port Stephens, or isolated. I have seen a nest built about 18 feet from the ground, but the usual height is between 50 feet and 80 feet. The eggs vary in tint, but are usually a light bluish-green.

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**For Sale.**—Broinowski's work on "The Birds of Australia," complete in 6 vols., bound in morocco. H. A. Purnell, Buckland-avenue, Geelong.

Mr. Purnell wishes to hear from any member who has spare copies of *The Emu*, vol. iii., parts 1 and 4.

## "Official Check-list of the Birds of Australia."

### PROPOSED SECOND EDITION.

MEMBERS will be pleased to know that ornithologists have heartily welcomed the proposal of the Council that a committee should present recommendations concerning a second edition of the "Official Check-list." Without exception, members have signified their approval and their desire to assist.

Australian ornithologists will be pleased that Mr. Mathews, who has done such valuable work for many years past for Australian ornithology, has agreed to co-operate. The Council requested his assistance, and appreciates his prompt and ready offer sent before he could receive the request. It may not be out of place to state here, as the list for Mr. Mathews' monumental work, "The Birds of Australia," will be closed shortly, that the Council regrets much that he did not allow the Council and editors the privilege of reviewing officially or seeing officially the parts of this great work, though they were sent to at least one newspaper in Melbourne. However, the Council bears no ill feeling in the matter, and extends a hearty welcome to Mr. Mathews.

The following notes are collated from material mostly worked up by Mr. Mathews and published in his various lists of Australian birds, the *Austral Avian Record*, and his "Birds of Australia" (vols. i.-iii., and vol. iv. in part).

In order that members of the R.A.O.U. may have before them sufficient evidence to enable them to give an intelligent vote \* on the use of the B.O.U. generic and specific names for the second edition of the "Official Check-list," the following facts concerning the generic and specific names of the "Check-list" are given:—

#### A.—GENERIC NAMES.

There are 333 genera for the 751 species of the "Check-list." Three-quarters (251) of the generic names are common to Mathews' 1913 list and the "Check-list." Thirty-five extra-limital generic names are apparently valid, though Mr. Mathews has considered the Australian representatives to be worthy of generic rank. Thus, only 47 of the "Check-list" generic names are in question. Seven of these are settled by the new B.O.U. list, and five are "preoccupied," for the same name was used earlier for another animal, so that only 35 need be considered. Twenty of these have an earlier valid name. There seems to be no reason for refusing to use these 20 prior names, so that only 15 names can cause trouble. Three of these are objected to under "one-letterism"—that is, there is a similar name which possibly invalidates the "Check-list" name. However, "one-letterism" has been stretched until it is claimed that *Melophagus* (the sheep tick)

\* A vote is necessary, as the proposal departs from the principles accepted at the Launceston session in 1911.

invalidates *Meliphaga* (a Honey-eater), and will possibly cause more trouble and upset than any other phase of scientific nomenclature. Deducting those three, 12 "Check-list" generic names must be considered; confusion concerning types and similarly-named species causes trouble in nine cases; and there are three simple cases for the committee to investigate.

Thus, of a total of 333 "Check-list" genera,  
251 agree with Mathews' list.

- (1.) 35 are divided by Mr. Mathews from extra-limital genera.
- (2.) 7 are settled by the B.O.U. list.
- (3.) 5 are preoccupied.
- (4.) 20 have a prior name.
- (5.) 3 come under "one-letterism."
- (6.) 12 differ for various reasons.

The genera are set out under these six heads.

R.A.O.U. "CHECK-LIST" GENERA (35) APPARENTLY RECOGNIZED AS VALID, BUT THE AUSTRALIAN BIRDS ARE PLACED IN SEPARATE GENERA BY MR. MATHEWS, WHOSE NAMES ARE IN BRACKETS.

*Coturnix* (*Maroturnix*), *Tomirdus* (*Rallina*), *Pachyptila* (*Prion*), *Bruchigavia* (*Larus*), *Cirrepidesmus* (*Ochlhodromus*), *Totanus* (*Iliornis*), *Gallinago* (*Ditelmatias*), *Irediparra* (*Parra*), *Edicnemus* (*Burhinus*), *Austrotis* (*Choriotis*), *Platalea* (*Spatherochia*), *Cheniscus* (*Nettapus*), *Radjah* (*Tadorna*), *Virago* (*Nettion*), *Phaethon* (*Scæophaethon*), *Pelecanus* (*Catoptropelicanus*), *Astur* (*Urospizza*), *Haliaeetus* (*Cuncuma*), *Ninox* (*Spiloglaux*), *Halcyon* (*Cyanalcyon*), *Uralcyon* (*Tanysiptera*), *Cosmærops* (*Merops*), *Coloburis* (*Pitta*), *Petrochelidon* (*Hylochelidon*), *Arses* (*Orphryzone*), *Edolisoma* (*Metagraucalus*), *Pomatorhinus* (*Pomatostomus*), *Acrocephalus* (*Conopoderas*), *Megalurus* (*Poodytes*), *Dicaeum* (*Austrodicaeum*), *Anthus* (*Austranthus*), *Motacilla* (*Budytes*), *Oriolus* (*Mimeta*), *Chibia* (*Dicruropsis*), *Aplonis* (*Metallospar*).

#### NAMES FIXED BY B.O.U. LIST.

1.—*Æstrelata* (R.A.O.U.) *v.* *Pterodroma* (1913 list).

*Pterodroma*, Bonaparte, Comptes Redus Sci., vol. xlii., p. 768 (1856) *v.* *Æstrelata*, *ib.*, *ib.* *Pterodroma* (genus 4) is used a few lines before *Æstrelata* (genus 11). The B.O.U. "committee have not considered it advisable to substitute *Pterodroma* for *Æstrelata*, as there is not even a question of page priority." Mathews' 1913 list recognizes both as distinct genera, but the B.O.U. list says (p. 398) the two "birds are undoubtedly congeneric."

2.—*Petrella*, Zimmerman, ed. Bartram's Trav. Carolina, 1793, *v.* *Daption*, Stephens, 1826. The B.O.U. list does not refer to *Petrella*, but uses *Daption*.

3.—*Hydroprogne*, Kaup., 1829, *v.* *Sylochelidon*, Brehm., 1831. The B.O.U. list uses *Sterna*.

- 4.—*Charadrius* (R.A.O.U. and B.O.U.) *v. Pluvialis* (1913 list).
- 5.—*Egialitis* (R.A.O.U. and B.O.U.) *v. Charadrius* (1913 list).
- 6.—*Tringa* (R.A.O.U. and B.O.U.) *v. Canutus*, &c. (1913 list).
- 7.—*Flammea* (B.O.U.), *Strix* (R.A.O.U.) *v. Tyto*, for Barn Owl (1913 list).

"CHECK-LIST" NAMES PREOCCUPIED (5).

- 1.—*Macronectes*, Richmond, 1906, instead of *Ossifraga* (not Wood, 1836), Hombron et Jacquinot, 1844.
- 2.—*Lobibyx*, Heine, 1890, instead of *Lobivanellus* (not Strickland, 1841), Reichenbach, 1852.
- 3.—*Threskiornis*, Gray, 1842, instead of *Ibis*, Cuvier, 1829, preoccupied by *Ibis*, Lacepède, 1799.
- 4.—*Opopssitta*, Scäter, 1860, instead of *Cyclopsitta* (not Reichenbach, 1850), Gould (?)
- 5.—*Grantiella*, Mathews, 1911, instead of *Eutomophila* (not Horsfield, 1820), Gould, 1838.

"CHECK-LIST" GENERA (20) FOR WHICH THERE IS A VALID PRIOR NAME.

- 1.—*Alectura*, Latham, 1824, *v. Catheturus*, Swainson, 1837.
- 2.—*Eudytes*, Vieillot, April, 1816, *v. Catarrhactes*, Cuvier, Dec., 1816.
- 3.—*Procellaria*, Linnaeus, 1758, *v. Majaqueus*, Reichenbach, 1852.
- 4.—*Catharacta*, Brinnich, 1764, *v. Megalestris*, Bonaparte, 1856.
- 5.—*Erolia*, Vieillot, 1816, *v. Ancylochilus*, Kaup., 1829.
- 6.—*Rostratula*, Vieillot, Apr., 1816, *v. Rhynchea*, Cuvier, Dec., 1816.
- 7.—*Egretta*, Forster, 1817, *v. Garzetta*, Kaup., 1829.
- 8.—*Ardetta*, Gray, 1842, *v. Ixobrychus*, Billberg, 1828.
- 9.—*Chenonetta*, Brandt, 1836, *v. Chlamydochen*, Bonaparte, 1856.
- 10.—*Oxyura*, Bonaparte, 1832, *v. Erismatura*, Bonaparte, 1832.
- 11.—*Anhinga*, Brisson, 1760, *v. Plotus*, Linné, 1766.
- 12.—*Fregata*, Lacepède, 1802, *v. Tachypetes*, Vieillot, 1816.
- 13.—*Psittenteles*, Bonaparte, 1854, *v. Ptilosclera*, Gould, 1865.
- 14.—*Solenoglossus*, Ranzani, 1821, *v. Microglossus*, Vieillot, 1822.
- 15.—*Leptolophus*, Swainson, 1833, *v. Calopsitta*, Lesson, 1835.
- 16.—*Lathamus*, Lesson, 1830, *v. Euphema*, Wagler, 1832.
- 17.—*Polophilus*, Leach, 1814, *v. Centropus*, Illiger (?)
- 18.—*Coracina*, Vieillot, April, 1816, *v. Graucalus*, Cuvier, Dec., 1816.
- 19.—*Phylidonyris*, Lesson, 1830, *v. Lichmera*, Cabanis, 1851.
- 20.—*Lonchura*, Sykes, 1832, *v. Munia*, Hodgson, 1836.

NAMES (3) AFFECTED BY "ONE-LETTERISM."

- 1.—*Alphagygis*, proposed for *Gygis* (not *Gyges*, Bory de St. Vincent, 1825), Wagler, 1832.
- 2.—*Mathewsia* (Iredale, 1911) proposed for *Antigone* (not *Antigona*, Schumacher, 1817), Reichenbach, 1852. Mr. Iredale,

while maintaining that *Mathewsia* is not invalidated by a prior *Matthewsia* and *Matthewsium*, has proposed to change *Mathewsia* to *Mathewsena*. He claims that *Antigone* is invalidated by a prior *Antigona*. Professor Brasil has claimed that it is not.

- 3.—*Micropus* (Meyer and Wolf, 1810) as a substitute for *Apus* (not *Apos*, Scopoli, *Introd. Nat. Hist.*, 1777, p. 404), Scopoli, *ib.*, p. 483. The "Check-list" name, *Cypselus* (not *Cypsela*, Meigen, 1800), Illiger, 1811, is a substitute name for *Micropus*, which was a prior name used for a plant. That is allowed now, for zoologists and botanists agree to differ as to rules of nomenclature.

Mathews, though providing substitute names in the *Austral Avian Record*, used very few of them in his 1913 list. Members should realize what is involved in "one-letterism." The law of priority caused 20 changes. "One-letterism" will possibly affect many more names. *Synoicus* (*Synoicum*), *Spathopterus* (*Spatheroptera*), *Trichodere* (*Trichoderes*), *Heteromyia*s (*Heteromyia*) *Limicola* (*Limicula*), *Leptotarsis* (*Leptotarsus*), *Tyto* (*Tyta*), *Coracina* (*Coracinus*), *Ptilotis* (*Ptilotus*), *Mimeta* (*Mimetes*), *Animeta* (*Mimeta*), and *Meliphaga* (*Melophagus*) are some of the Australian names concerned.

Another class of name, however, might cause confusion. *Purnella* (1914) resembles *Prunella* (1846). *Toburides* is a rearrangement of *Butorides*, and *Melomyza* of *Myzomela*. Some day it might be claimed that this class of name must go, though *Dacelo*, as a variant of *Alcedo*, has stood the test of 100 years. *Apis* (the bee) and *Aphis* have stood for over 150 years, and have never caused confusion. Why anticipate and make trouble with "one-letterism"? Each case needs careful consideration, and no general rule should be declared.

Practice is inconsistent. The B.O.U. list claims *Tyto* invalidates *Tyto* (used by Mr. Mathews), and yet uses *Galerida*, a "mistake" for *Galerita*, which is not invalidated by the prior use of *Galerita*. Mr. Mathews has claimed that *Melophagus* invalidates *Meliphaga*, and yet uses *Coracina* (1816), though there is a prior *Coracinus* (1814).

#### NAMES (12) DIFFERENT FOR VARIOUS REASONS.

- 1 and 2.—*Aprosmictus*, Gould, 1842; type by subsequent designation of Gray, 1855, *Psittacus erythropterus*, Gmelin. Synonym.

*Ptistes*, Gould, 1865; type, *Psittacus erythropterus*, Gmelin. *Aprosmictus* must be used for the Red-winged Lory. Mr. Mathews has suggested *Alisterus*, with *Psittacus cyanopygius*, Vieillot (the King Parrot), as type.

- 3.—*Mesocalius*, type by monotypy (the only species), *Cuculus palliolatus*, Latham. As this species cannot be determined at present, this genus cannot be defined. Though Cabanis included the genus *Chalcites* with one species, *osculans*, as

a synonym, Mr. Mathews has suggested *Owenavis* as a substitute name for *Mesocalius*.

- 4.—*Chalcooccyx* is connected with so much uncertainty that Mr. Mathews has suggested *Neochalcites* in the *Austral Avian Record*, vol. i., p. 5.
- 5.—*Amytornis*, Stejneger, 1885, is declared a *nomen nudum*. Oberholser, 1899, named *Malurus textilis* as the type for his substitute name *Diaphorillas*, and antedated Sharpe's "Hand-list," where *Malurus textilis* is given as the type of *Amytornis*. *Amytis* (not Savigny, 1826), Lesson, 1831, is preoccupied.
- 6 and 7.—*Meliphaga*, Lewin, 1812; type by subsequent designation of Gray, 1840, *Meliphaga chrysotis*, Lewin = *Meliphaga lewinii*, Swainson (the Yellow-eared Honey-eater). *Ptilotis*, Swainson, 1837, is based on the same species. Hence *Meliphaga* must be used for the Yellow-eared Honey-eater, and *Ptilotis* becomes a synonym of it.
- Swainson, 1837, used *Zanthomiza* for *Merops phrygius*, Shaw, which, being the only species, became by monotypy the type of the new genus for the Regent Honey-eater.
- 8 and 9.—*Anthochaera carunculata*, Vigors and Horsfield, was confused with *Merops carunculata*, Latham. Apparently *Anthochaera* must be used for the Brush Wattle-Bird, and *Coleia* for the Red Wattle-Bird. The vernacular names of the Wattle-Birds have been transposed in the 1898 "yellow list," and also in Mathews' 1913 list.
- 10.—*Esacus* ("Check-list") v. *Orthorhamphus* (1913 list).
- 11.—*Campephaga* ("Check-list") v. *Lalage* (1913 list).
- 12.—*Centropus* ("Check-list") v. *Polophilus* (1913 list).

Ninety-one\* of the R.A.O.U. "Check-list" genera are included in 82 genera of the new B.O.U. list. On the same basis the 333 "Check-list" genera might be grouped in about 300 genera.

The A.O.U. "Check-list of North American Birds" has 322 genera for 800 species.

The new B.O.U. "List of British Birds" has 206 genera for 423 species (475 species and sub-species).

The R.A.O.U. list might have on this generic basis 300 genera for 751 species ("Check-list"), 666 species (1913 list).

Mathews has used over 500 genera for the 666 species.

Accepting the B.O.U. genera and approximate generic standard—for, of course, there is no fixed generic standard—it should not be difficult for a second "Check-list" Committee to arrive at a generic list that all could accept.

#### B.—SPECIFIC NAMES.

An examination of the specific names of the "Official Check-list" shows that over 600 (80%) of them are used by Mr. Mathews in his

\* See list of genera in *The Emu*, vol. xv., part 1, 1915.

1913 list. That author has emphasized the close relationship of the birds of Australia to those of neighbouring and even more remote lands, by classifying over 70 of the "Check-list" species as sub-species of extra-limital species (some with different names). Over 80 of the 751 species of the "Check-list" are regarded as worthy of sub-specific rank only by Mr. Matthews. Twenty-four of the "Check-list" specific names were preoccupied, while for 80 of them a prior name had been given. Ten names are fixed by the B.O.U. list, and 33 names require further consideration or more evidence as to validity as Australian species.

462 species names, 1913 list and "Check-list."

81 names valid; sub-species (G. M. M.).

61 names valid; sub-species of extra-limital species.

604 names common to "Check-list" and 1913 list.

10 names fixed by B.O.U. list.

24 preoccupied.

80 names for which there was a prior name.

33 names for further evidence.

751, total.

## Camera Craft Notes.

**Camera versus Gun.**—Reviewing "Life-Histories of African Game Animals," by Theodore Roosevelt and Edmund Heller, *The Times Literary Supplement* (issue 14th May, 1915) says, *inter alia* :— "The numbers of those who abandon the rifle for the camera is steadily on the increase; it is becoming recognized that the work of the naturalist who can bring the living animals before the eyes of others is now of higher value to the progress of the science of natural history than the work of the collector of specimens. Each is, of course, complementary to the other, but the time has now come when the hunter must give way to the observer."

**Shrike-Thrush Tamed.**—Three years ago a pair of Whistling Shrike-Thrushes (*Colluricincla selbii*) began to come about the back garden of our residence. To encourage them, various scraps were placed in prominent positions, but the birds' preference for fat was soon noticed. They always took the larger pieces to a crack in the ridge of the wood-shed. This crack held the meat secure, and the birds were able to tug off pieces. Long-tailed Wren-Warblers (*Malurus longicaudus*) and Grey Butcher-Birds (*Cracticus cinereus*), discovering that the Shrike-Thrushes often left a reserve store in the "cupboard," paid surprise visits to it. During my sister's long illness, when she spent much time on the verandah, these Shrike-Thrushes became very tame, sitting on her head, running



Whistling Shrike-Thrush at Window.

FROM A PHOTO. BY (MISS) J. A. FLETCHER.

along her arm, and flying down to take butter from her plate. The female is the tamer of the two birds, and will take food from the hand. Food is generally placed on the window-sill, and it is a pretty sight to see a Thrush perched there eating while we are at the table.—(MISS) J. A. FLETCHER. Springfield (Tas.), 18/8/15.

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**Plain-Wanderer in Captivity.**—The Plain-Wanderer (*Pedionomus torquatus*) is now very rare, and is seldom seen in the field by the ornithologist. A friend of mine, who spends almost every spare hour in the field with his dogs, brought me in a female bird, which he had caught while it was being set by a dog. The bird made no attempt to fly, and allowed my friend to pick it up from the ground. Early next morning I arranged to photograph the Plain-Wanderer, and I placed it in a box which had a wire-netting front. Having made an opening in the side of the box for the camera lens to fit, I started to get the focus, for the bird would not stand quiet a second: it insisted on running, with head erect, round and round the box. After waiting for a while, I

secured six snapshots. It is most interesting to note that, in each picture, the bird is standing on its toes. Of course, it would be impossible to secure a photograph of this bird in a standing position in the field.

Early in August this year fresh footprints of the Plain-Wanderer were seen. They had been made in crossing a marshy swamp



Plain-Wanderer.

FROM A PHOTO. BY H. A. PURNELL.

in the midst of country suitable as a haunt of the birds. Plain-Wanderers were at one time very plentiful around the Geelong district, but, on account of extensive cultivation, their natural feeding-grounds are fast disappearing. Last summer a dead bird (fresh) was found early one morning beside the pavilion of the football reserve, which is at the rear of the Botanical Gardens. It appeared to me that the bird had flown against the high wall during the night, and so met its death. The late K. H. Bennett

said that the Plain-Wanderer was nocturnal in its habits. This may be a fact, for I noticed that while I kept a bird in captivity it never seemed to sleep or rest. Whenever I looked into its enclosure at any time in the night the bird was always wide awake and running round. Mr. Gregory M. Mathews, who was staying with me at the time, was very interested in these habits.—H. A. PURNELL. Geelong (Vic.), 7/9/15.

**Trustful Subjects.**—It is remarkable how quickly most birds become accustomed to anything unusual in their surroundings. Particularly is this noticeable when one wishes to obtain photographs. If sufficient time is available, almost any bird will eventually lose its fear of camera and operators.



Great Brown Kingfisher.

FROM A PHOTO, BY R. T. LITTLEJOHNS.

Unusual trustfulness is shown by four Great Brown Kingfishers (*Dacelo gigas*), which depend largely for their food supply on the hospitality of some of the residents of Upper Ferntree Gully, Victoria. Very soon after our arrival at a week-end house there, the birds put in an appearance on the doorstep and accepted food

from our hands. It was easy to obtain photographs. A bird was enticed with pieces of raw meat to a stump near the back door, and the presence of the camera, at a distance of two feet, was not noticed so long as the meat supply lasted.

In November, 1914, we spent the whole of one day photographing a pair of Buff-tailed Tit-Warblers (*Acanthiza reguloides*). For three hours or more the birds could not be induced to face the camera, and the chance of obtaining a photograph seemed remote.



Buff-tailed Tit-Warbler.

FROM A PHOTO. BY S. A. LAWRENCE.

However, we persevered, and soon had the satisfaction of being able to expose a few plates. Once having braved the lens and met with no harm, both birds became much more trusting, and, before we left had become so tame as to feed their young on our hands. We obtained pictures of them in this position. We have also taken similar photographs of a female Mistletoe-Bird (*Dicaeum hirundinaceum*), but in that case more patience was required.—R. T. LITTLEJOHNS and S. A. LAWRENCE. Melbourne, 20/8/15.





Australian Ground-Thrush.

FROM A PHOTO. BY CHARLES BARRETT.

**Among the Tea-tree.**—One of my favourite haunts in early bird-observing days was the belt of tea-tree (*Leptospermum laevigatum*) along the coast of Port Phillip Bay, between Sandringham and Mordialloc. Fifteen years ago the scrub was much denser than it is now in some places, especially Black Rock, and many species of birds nested freely in the shady groves. Whenever I rambled through the tea-tree I saw numbers of Australian Ground-Thrushes (*Oreocincla lunulata*), and in early spring found many of their beautiful nests. The stream of settlement has flowed through the coastal districts, and in the last few years Ground-Thrushes have become comparatively rare. I have not found a nest along the coast for several seasons, and have seen the birds only on a few occasions. When week-enders come, birds which love quiet, secluded haunts depart.

I write of the Ground-Thrushes in the coastal tea-tree because they were the first birds that I stalked with a camera. I found it fairly easy, by stepping softly on the leaf mould, to approach close to a Thrush, but the light was not strong enough in the groves to permit of a quick exposure. However, one morning, aided by strategy, patience, and two friends, I succeeded in getting a good photograph. A Thrush was observed feeding in a little glade. Camera in hand, I walked slowly towards the bird, while my companions did the same from different points—we formed a triangle. When about 12 feet away I erected the camera, and then moved it forward a few inches at a time. The Thrush stopped hunting in the moss for insects, and looked round. It saw three motionless figures and the camera. When it turned its gaze on one or other of my friends I moved a step nearer, and so proceeded till I was only 6 feet from the bird. Then I focussed, and was able to give an exposure of nearly two seconds, during which the subject remained perfectly still. When I lifted the camera the Thrush ran daintily over the moss, and was soon lost among shadows.

Later in the season photographs of the young birds were obtained. Nests and eggs, of course, presented very little difficulty. The nests are usually composed externally of fresh, glistening, green moss, and are readily seen by eyes used to the twilight of the tea-tree groves. At Black Rock I have seen large areas of moss-covered ground which have been "ploughed" by Thrushes' beaks. In quest of food they turn over the moss or tear it up. It seems natural that they should use such material for nest-building.—CHARLES BARRETT. Melbourne, 9/8/15.

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**Roll of Honour.**—The Council of the R.A.O.U. proposes to publish in the next issue of *The Emu* the names of those members who are on active service. Would members kindly forward any name known to them to the hon. secretary, Zoological Gardens, Melbourne?

## Review.

[“ Scientific Notes on an Expedition into the Interior of Australia, carried out by Captain S. A. White, M.B.O.U., from July to October, 1913.”]

CAPTAIN S. A. White, M.B.O.U., president of the R.A.O.U., is to be heartily congratulated on the publication in the *Transactions of the Royal Society of South Australia*, vol. xxxviii., 1914, of the scientific results of the adventuresome camel trip made by his devoted wife and himself into the “ Dead Heart of Australia.”

Captain White has supplied the interesting narrative of the expedition and the valuable ornithological notes. Fourteen other scientists, whose names are well known in their several fields of science, report on the general zoological, botanical, and geological collections. Important results were achieved, and many species and sub-species new to science were obtained. A fine series of beautiful photographs illustrates some unique features of that remarkable region.

Painstaking, thorough, and scientific, this successful work enhances Captain White’s reputation as one of Australasia’s leading field ornithologists.

## Stray Feathers.

**Bird-Observing in Uganda.**—Many members of the R.A.O.U. know Mr. C. F. Belcher personally, and his name must be familiar to all. Mr. Belcher was formerly co-editor of *The Emu*, and he has done much for the Union. He now holds a high official position in Uganda, and in a letter from Entebbe, dated 6th May, 1915, to Mr. H. A. Purnell, R.A.O.U., of Geelong, Vic., gives some interesting notes on the bird life of that part of the Empire.

“ The Governor has a magnificent collection (of eggs), and I have learned all I know of Uganda birds from him,” writes Mr. Belcher. “ This is really a marvellous bird country, because, if you travel 10 or 20 miles you seem to run into quite a fresh lot. And then there are some birds breeding at any time of the year you can think of, though just now, in the big rains, is the time when most are laying, and there is a second pretty extensive laying about November, in the small rains. Curiously enough, though I must by now have noted well over 200 species in Entebbe, I have only the eggs of twenty. I will try and list them from memory:—Cormorants (3), Heron (1), Kingfisher (1), Coly (1), Swallows (4), Weavers (8), Plover (1), Shrike (1), Bulbul (1), Zosterops (1), Sun-Birds (3), Warblers (2), Lark (1), Weaver-Finches (3). But, of course, these were all taken practically in the township, most of them in streets and gardens. The Cormorants I got from an island about a mile away, which H.E. and I have visited several times—the most recent being yesterday evening. Rather, I should say it is a group of islets, and the Heron and

Cormorant rookery is in ambatch (a sort of bean, like a prickly acacia), growing in the shallow water off the largest islet. These bushes are about 6 or 7 feet out of the water only, rather as Mangroves grow. You have to put on waders, or you would be scratched to bits, and even then the climbing about on the prickly branches is rather a task. I should say there were about a hundred nests of the Cow Egret (*Bubulcus*), half a dozen of the Egret (*Garzetta*), thirty each of the big Cormorant and the Darter, and a few of the Little Cormorant. Of course, the Cormorants are different from yours, though the Darter seems very close to the Australian bird. . . .

"The colours of the birds just here are nothing marvellous, except for the Sun-Birds, but very many have good singing powers, and the nests of most, especially Flycatchers, are beautiful. . . . I think I told you there were eight Swallows here; well, counting Martins, there are nearer twelve. Last Saturday alone, on a canoe trip with H.E., upon an arm of the lake, I saw seven species of different kinds of birds new to me. You can imagine what a glorious place for bird-lovers it is, once you get to know a little about the species. Of course, if Sir Frederick Jackson were not here I should have taken years to find out what, as it is, I have learned in seven months."

\* \* \*

**Restless Flycatcher's Notes.**—*Apropos* of the notes from Western Australia regarding the Restless Flycatcher (*Seisura inquieta*),\* it is a most curious thing that so many prominent ornithologists were of Gilbert's opinion that the "scissors-grinding" sounds are "only emitted while the bird is in a hovering position a few feet from the ground." Mr. Robert Hall and Dr. J. A. Leach both passed this belief on, and Captain S. A. White remarked † that, on Eyre Peninsula, he learned that *Seisura* "only makes the strange grinding noise when hovering over the ground." Consequent on this latter observation, Captain White published in *The Emu* a little later ‡ a note I sent him, reporting the Flycatcher as "whirring" both while perched on the ground and on stumps. And now comes corroboration from the West! In the three years intervening I have, however, come to regard it as a commonplace to hear the Restless Flycatcher "wheezing" ecstatically while sitting still. The last instance of the kind came under my notice a few days ago (1st August); but this was rather remarkable from the fact that the Flycatcher in question had an Australian Brown Flycatcher (*Micræca fascians*) dancing attendance upon it. Occasionally the two birds would perch about one foot apart on a fence rail, while *Seisura inquieta* whirred and the Brown Flycatcher kept a wary eye on the ground. And everywhere the Restless Flycatcher went the little brown bird followed.

\* *Emu*, vol. xv., part 1, pp. 53, 54.

† *Emu*, vol. xii., part 1, p. 4.

‡ *Emu*, vol. xii., part 2, p. 134.

Query—Did the Brown Flycatcher follow the larger bird to secure insects disturbed by the “scissors-grinding” notes? It really seemed so, for the Restless Flycatcher did not altogether approve of the partnership, and tried to chase his attendant away more than once. But the latter was not to be denied, and the two were together till I lost sight of them.

On another occasion I had an opportunity of seeing a Restless Flycatcher at close range. The grinding notes began very low, seeming to come from right down in the bird's throat, and gradually worked up to full strength, when the bill was gaping wide like that of a brooding bird suffering from the heat. As characteristic as the rasping notes, too, are the *calls* of the Restless Flycatcher; I do not think that the “whirring extraordinary” is in any sense a call. The most common of these is a note that would be phonetically expressed as “Britch”—usually uttered while the bird is zigzagging over the tree-tops—and next comes a penetrating pipe, “Pee-pee-pee, towhee-twee-twee.” A *Seisura* that I frequently saw and heard calling thus while perched on headstones in a cemetery did not seem at all out of place. In its nesting the Restless Flycatcher is by no means so business-like or neat as the bird it is often mistaken for, *Rhipidura motacilloides*. Last spring I knew of an orchard wherein a pair of each species began building at the same time. The Black-and-White Fantail's nest rapidly took form, but the Flycatchers could not get fairly going. They would scratch about on the dry branchlet selected as the nesting-site, but could not get the fibres to stay in position against the strong breezes, and finally gave up the attempt. Earlier in the same season I saw other Restless Flycatchers similarly troubled, for the winds ran high in the dry spring of last year. One pair was twice thwarted in an endeavour to build, but succeeded on the third attempt (in a new position), whereupon a pair of Black-and-White Fantails built in the same tree, on the identical spot that the Flycatchers had unsuccessfully selected in their second attempt.—A. H. CHISHOLM. Maryborough (Vic.), 6/8/15.

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### From Magazines, &c.

**Nest Built in Trench.**—Corporal Percy Smith, in a letter, dated 10th June, from Gallipoli, to a friend in Bendigo, which was published in the Melbourne *Herald* of 7th August, 1915, states that a bird's nest was found in a trench in which a shell had just burst. “Strange things happen in the trenches at times,” he writes. “One of the most extraordinary was the finding of a bird's nest with four eggs. While going through the communication trenches a small bird was seen to fly out of the side, and I began to look where it came from. A shell had burst in the trench, and dirt had fallen off the sides. Among the larger pieces of earth

was a neatly woven bird's nest with four eggs in it. It seems a miracle that a bird should select a communication trench in which to breed its young. I will look on this novelty with a great deal of interest, and watch the result closely."

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**Pale-headed Parrots.**—In the April, 1915, issue of the *Avicultural Magazine* the Marquis of Tavistock writes of "Some Experiences of Mealy Rosellas." Following is an extract from this interesting article:—

"The popular name of *Platycercus pallidiceps* is undoubtedly open to objection, since the word 'Rosella' is nothing more than a meaningless corruption of Rose-hill, a place which the bird in question does not, I believe, frequent. Still, if one were to mention a 'Pale-headed Parrakeet,' I doubt if nine aviculturists out of ten would be much the wiser; so perhaps it is best after all to stick to the familiar title. Some people are disposed to crab the Mealy Rosella on account of the rather washy and undecided tints of his-head and neck, but to my mind he is a very lovely bird—what Broadtail, indeed, is not?—and few more tasteful combinations of colour exist than the primrose and blue which adorn the greater part of his plumage. His disposition, alas! does not correspond to the beauty of his outward appearance; in fact, when fully adult and in good health, he can only be described as a spiteful brute. His two pet aversions are the Blue-bonnet and his near relative the Red Rosella. Alone among the *Platycercinae* he is often able to inspire with fear and respect the pert, irascible little monkey in brown and blue, while for the Red Rosella he shows a most unbounded contempt. Hybrids between *P. pallidiceps* and *P. eximius* have been produced in captivity, and may also have occurred wild in Australia, but in my own experience I have never known the two species show any desire to associate except when quite young. Even when I have had odd birds of opposite sexes flying together at liberty for several months, they have never been seen to meet except on the most unfriendly terms. . . .

"During the course of last summer, two new Mealies came into my possession—both, unfortunately, to die after a few weeks—which were interesting from a scientific point of view, and showed curious variations of plumage. The first, a hen, had the crown of the head thickly covered with strawberry-pink feathers, and showed, besides, an unusual amount of blue on the cheeks and on the upper part of the neck. A tendency to erythrim, it may be noted, is characteristic of several species of Australian Parrakeets, individual Browns, Rosellas, Yellow-bellies, and Many-colours often showing an abnormal amount of red in their plumage. The case of the Red-vented Blue-bonnet is very similar, and personally I do not consider *Psephotus hæmatorrhous* as really a good species. The second bird I received was a typical *P. amathusia*, the first I have ever seen alive. He was much paler in colour than the

hen just mentioned, quite like an ordinary 'Moreton Bay' Rosella in many respects, but he had a dark blue patch on the lower cheek, not the circular patch one sees in a Pennant or Yellow-rump, which starts from the base of the lower mandible, but a kind of half-moon lying low on the cheek and not reaching the beak at all. Although this blue cheek-patch is a very noticeable feature, the general resemblance between *P. amathusia* and *P. pallidiceps* is so striking that one can hardly fail to regard them as local races of one variable species, and a series of skins obtained from different localities would probably show the complete gradation of one form into the other. In describing the habits of my Mealy Rosellas there is one point I have forgotten to mention—viz., their playfulness. The *Platycerci* as a family are very serious-minded birds, and do not give themselves up to light-hearted antics. But here the Mealy is rather an exception, and I have sometimes seen my birds playing in true Parrot fashion: turning somersaults, throwing bits of stick about, lying on their backs, and hopping wildly round with spread tails. I once had a Barnard's Parrakeet who behaved in much the same fashion, apparently from delight at the successful hatching of his first family (he was quite a young bird). But I have never known another of his species forget his dignity to such an extent, and the Mealy Rosella is the only true Broadtail that I have often seen play."

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### Annual Meeting Postponed.

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It has been unanimously decided by the Council of the Royal Australasian Ornithologists' Union to

#### POSTPONE THE ANNUAL MEETING,

which was to have been held in Queensland this year, and to do the business of the session by correspondence. This decision has been made because Queensland has suffered severely from the drought; and also the Council considers that all our energies and spare money should go towards helping our country in its time of need consequent upon the dreadful war.





THE WHITE-THROATED SHRIKE-ROBIN  
*Poecilodryas albigularis.*

# The Emu

Official Organ of the Royal Australasian Ornithologists' Union.

"Birds of a feather."

VOL. XV.]

1ST JANUARY, 1916.

[PART 3.

## Poecilodryas albigularis (Rothschild and Hartert).

BY A. J. CAMPBELL, C.M.B.O.U., MELBOURNE.

THE White-throated Shrike-Robin was first discovered by Mr. Harry Barnard, at Cape York, while collecting for Mr. Dudley Le Souëf, Col. C. S. Ryan, and the late Dr. Wm. Snowball, during the season 1896-7. The specimen figured is a male procured by him, and now in the private collection of Mr. H. L. White, Belltrees, N.S.W.

*General Description.*—Upper surface olive-green; tail feathers light brown edged with olive; ear coverts and forehead blackish-brown, which colour extends over the eye and blends into the dark grey of the crown of head; face, including a narrow rim round the eye, and throat pure white; under surface yellow, of a slightly greenish tinge; bill black or dark brown; legs and feet flesh colour.

Dimensions:—Total length,  $4\frac{5}{8}$  inches; wing, 3; tail,  $1\frac{3}{4}$ ; tarsus,  $\frac{3}{4}$ .

Commenting on the New Guinea bird (*P. albifacies*, Sharpe), Drs. Rothschild and Hartert (*Nov. Zool.*, xiv., p. 459) state that "specimens from Cape York (Queensland) have not only the chin but nearly the whole of the throat for about 1 cm. white, and the pileum is slightly more blackish. This form may be named *Poecilodryas leucops albigularis*, sub-sp. nov."

The specimen which became the type was collected by Mr. A. S. Meek, at Cape York, 21st July, 1898.

It may be here remarked that Mr. G. M. Mathews was inclined to bunch the *Poecilodryas* and *Pachycephala* under the latter genus. (See "Reference-list to the Birds of Australia," *Nov. Zool.*, xviii., p. 312.) Considered oologically—"by their fruits ye shall know them" is a truism—the birds differ much. *Poecilodryas* has a well-made nest, artistically decorated, and the eggs are greenish with reddish markings; *Pachycephalæ* build looser and shallower nests, and lay yellowish or olive-coloured eggs marked with olive or umber.

## A Trip to the Northern End of the Flinders Ranges.

BY (CAPT.) S. A. WHITE, M.B.O.U., PRESIDENT R.A.O.U.

THE vast interior of our island-continent has a great fascination for many people, especially scientists, for whom it holds an inexhaustible amount of material. A rare opportunity was afforded some members of the field naturalists' section of the Royal Society of South Australia (of which body the writer has the honour to be president) when Mr. and Mrs. J. Lindo, of Moolooloo cattle and sheep station, invited them to visit their home in the Flinders Ranges.

On the 8th October, 1915, at 7 a.m., fourteen persons, representing many branches of science, boarded the north train. The first day's journey was pleasant, for the weather was perfect and the train passed through a land of plenty. Waving cornfields spread out as far as the eye could reach on either side of the line. This was a great contrast to the scene in the previous October, when the writer passed through from Central Australia; then the country was bare and brown. The pretty little town of Quorn, nestled in a bend of the Flinders Ranges, was reached about 6 p.m., and here we remained for the night. At an early hour next morning a start was made further north upon the line, which ends at Oodnadatta. Soon after we started clouds of dust rose out upon the plain, and before long dust began to settle down upon everyone and everything in the train; this state of affairs continued for the rest of the journey. After leaving Hawker (about mid-day), and reaching the western side of the ranges (having passed right through them), the dust became worse, and we reached Parachilna railway station at about 2.30 p.m. in a dust storm. Here Mr. Lindo was awaiting the party with two four-horse teams.

When the luggage and human freight had been stowed away there was little room to spare, but a start was soon made through the dust and sand towards the ranges, which rose, bold and imposing, to the east. When the hilly country was reached the dust almost disappeared. The sleek horses which composed the teams were in great heart, and made little of the heavy loads up the steep inclines. At many places halts were made to collect botanical specimens or for bird-observing, and at one spot the peculiar formation of the rocks absorbed some of the photographers' time and material. The scenery was wild, rugged, and grand. Just at dark the horses swept down a gentle incline, passed the wool-shed, and tackled the last hill in good style. After 24 miles of up-hill work they pulled up at the entrance to a bright little garden at Moolooloo, where the party received a hearty welcome from Mrs. Lindo and family.

Moolooloo is situated in the Flinders Ranges, 2,000 feet above sea-level, about 400 miles north of Adelaide, and within 40 miles of the extreme end of these fine ranges. The station was the starting-point of the great explorer M'Douall Stuart in 1861, on

his transcontinental trip. Copper being discovered about that time, near the head station, the first owner, the late John Chambers, sold out for £20,000, and some time later Mr. W. B. Rounsevell sold for £50,000, and so the property has changed hands down to the present owner. "Moolooloo" is the native name for "sliding rock" or "slipping stone." This is well illustrated in the surrounding country, for in many places the cracking and disintegrating of the rock is very noticeable, and great quantities slide down the steep hills from time to time.

On the day after our arrival an excursion was made to Fourth Water. Some members of the party went round by the track in a four-horse conveyance, which also took the lunch for all; the remainder of the party set out on foot across country. One or two rugged hills had to be climbed. The scenery was fine, but several of the party who had never been so far north before did not dwell upon the scenery, as the day was warm and the flies rather troublesome. There were not many birds in these hills. The Victorian Grey Shrike-Thrush (*Colluricincla harmonica victoriæ*) was found breeding, and a number of *Eremophila* bushes in full blossom had attracted the Singing Honey-eater (*Meliphaga sonora*). Fine trees of the quandong, or native peach (*Fusanus acuminatus*) were breaking down under burdens of crimson fruit, and large bushes of *Pittosporum*, sp., enlivened the scene with bright orange berries. Oratunga Creek was struck near Third Water, and we followed the dry bed for a while till we came to the rocks bearing aboriginal carvings or chippings. Many examples of native art are to be found through the Flinders Ranges. They are supposed by some to be of great antiquity, as a reddish film covers the rocks and carvings, and resembles that upon the Pyramids of Egypt. There were many crude tracings, Emu tracks and eggs being prominent in the designs. Some were on the line with the sandy bed of the creek, which must have been much lower when the tracings were executed. Invariably these examples of aboriginal art are near a water-hole, and, if one can judge by the habits of natives of the present time, they were done while the artists were idling away the hottest hours of the day.

The Oratunga Creek, like all the creeks in the north, was lined on either side by fine river red gums (*Eucalyptus rostrata*), which in many instances grow in the sandy beds of the creeks. Some land shells were taken here in the crevices of the rocks—a species which, it is believed, has never before been taken with the living animals. After the photographers had spent some time upon the native tracings, a move was made up the sandy and rocky creek until we came to the trap and four hobbled horses. From here we turned up a tributary of the Oratunga Creek, and soon found the camp, where our hostess had prepared a lunch under a wide-spreading gum-tree close to a series of rock-holes. After lunch some time was spent in hunting for natural history specimens around the camp, and late in the afternoon we returned to the drag. The horses were harnessed, and some of the party

drove back; the remainder set out on foot by a different route from that taken in the morning. The return journey was interesting and profitable, for much material was collected by the way, and we reached the station at sundown.

Next day two four-horse teams and a pair-horse buggy conveyed the party to Fergusson Gorge. The last part of the journey we drove along the dry bed of a mountain torrent, which traversed a deep defile in the mountains. The scenery was wild and grand. Huge masses of barren rock towered over us in places, stately red gums grew along the creek, and picturesque pines (*Callitris robusta*) clad many of the mountain sides. After lunch the majority of the party continued on foot to the head of the gorge, where a deep gap allows the water in times of rain to pass through the range, as is the case with so many of these peculiar gaps in the north. A deep hole is worn in the solid rock, making a natural reservoir. This one, which was of large proportions, was filled with crystal-clear water. The photographers were busy with their cameras, botanists had plenty of work amidst the vegetation, while the ornithologist was recording the bird-life of the district. The Greenish Tree-Tit (*Smicrornis brevirostris viridescens*) was calling loudly from the gum-tree tops. The Cloncurry White-plumed Honey-eater (*Ptilotula penicillata leilavalensis*) was found in the gums along the creek; the melodious note of the Southern Rufous-breasted Thickhead (*Lewinornis rufiventris inornatus*) was heard in the scrub; the Australian Bee-eater (*Cosmærops ornatus*) was hawking for insects overhead; and from many of the leafy branches of the gums the unmistakable family call of the South Australian Pardalote (*Pardalotinus striatus subaffinis*) echoed through the gorge. The Brown Hawk (*Ieracidea berigora*) was seen and heard many times during the day. Upon returning to the camp it was found that the hobbled horses had split up into several parties, and it was some time before they were rounded up. Fortunately, the worst part of the return journey was negotiated before dark.

Our next excursion was on foot over the mountainous country at the back of Moolooloo Hill. There was much to interest us during the stiff climbs and steep descents. The season having been a good one in the district, the hills were beautifully green, and in some places many acres were covered in the fluffy purple plumes of *Trichinium exaltatum*, commonly called "pussy tails." We boiled the billy and had lunch in one of the deep gorges where a good supply of water was found. Afterwards the party split up into three sections, and returned by different routes. With two others, I descended the dry bed of an important creek; large gum-trees found a footing along its course. Great numbers of Bare-eyed Cockatoos (*Ducorpsius gymnopsis*) flew from tree to tree in front of us or whirled in large flocks over our heads, making the deep ravine echo again with their discordant cries. I discovered that we were disturbing these birds, which were feeding on the seeds of a wild pie-melon which had grown plentifully since the

last rain. The Cockatoos were ripping the melons to pieces with their bills and extracting ripening seeds. There were also a fair number of the Parrots which I have described as *Barnardius barnardi lindoi*\*—Lindo's Ring-neck Parrot. Leaving the creek, we made our way to the station through low scrub, principally *Acacia* and *Eremophila*. Here bird-life was more abundant. Numbers of Southern Yellow-fronted Honey-eaters (*Lichenostomus plumulus ethelaë*) were met with, also the Singing Honey-eater. A nest of the Redthroat (*Pyrrholæmus brunneus*), containing two eggs of this bird and one egg of the Black-eared Cuckoo (*Owenavis osculans*), was discovered.

On the 13th October the party left in two conveyances for Nuccalena copper mine, where the geologists spent a most interesting and profitable day. By the courtesy of Mr. Lindo I was shown over some most interesting but rough country, where many birds were observed. As soon as the party had left for the mine our host and I repaired to the well-built station stockyards, caught two saddle hacks, and were soon on the track. It is wonderful how sure these mountain-bred horses are; they can gallop about where horses not accustomed to the country could not keep their feet. Having cut across several ridges, we followed up the dry bed of a mountain stream, which after rain would be a raging torrent. This was plainly evident from the great water-worn boulders strewn along its channel. In some of the hollow branches and stems of the red gums which grew along the water-course Bare-eyed Cockatoos had found their nesting-places, and the birds made a great fuss as we rode underneath. Bright-plumaged Banded Parrots were also disturbed as we passed along. At a bend in the creek an alluvial flat had formed, and upon this soil a quantity of wild fuchsia bushes, often called "plum-bush" (*Eremophila*), were growing, and the flowers had attracted many birds, among them the rare Pied Honey-eater (*Certhionyx variegatus*). This is a record for furthest south for this bird, as far as I know. Eight or ten species of birds were identified in as many minutes. We left the bed of the creek and crossed over some steep and rough ridges, camping at Green Water-hole. Hobbling the horses, we had lunch under some fine gum-trees, beside a clear permanent spring. While we sat there several Bare-eyed Cockatoos came in to drink, and, when they caught sight of us, flew to a dead tree close by, where they partially opened their wings and raised the feathers of the forehead, keeping up their screeching call all the time. There was a number of Southern Plumed Honey-eaters and Cloncurry Honey-eaters around this water. From Green Water-hole we descended a tributary of Blackfellow Creek, then turned up the main channel. Darkness set in, but fortunately a new moon shed sufficient light to enable us to avoid the larger masses of rocks and boulders which were strewn along the dry bed of the creek. Strange to say, only

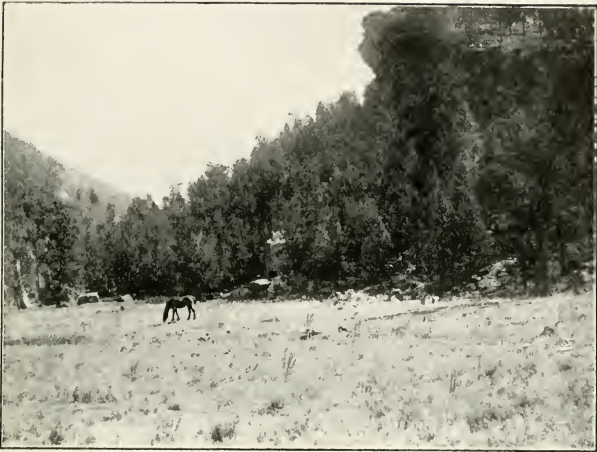
\* *S. A. Ornithologist*, vol. ii., part 5.

once did we hear a nocturnal bird call, and that was the Boobook Owl. It was very late when we reached the station.

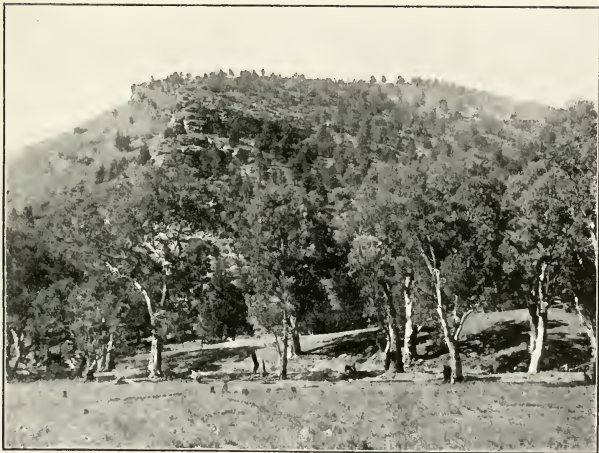
Most of the party drove over a mountain track to the foot of Mount Patawurtta on the following day, and climbed to the summit, 3,060 feet. During the descent two members lost their way in the scrub. This delayed the party, and, after a very perilous journey over mountain tracks, Moolooloo was reached at 11 p.m. The fauna and flora upon this peak (which is the highest in the district) are very distinct. In the scrub around the foot of the mount the Scrub-Robin (*Drymodes brunneopygia*) and Brown-headed Honey-eater (*Melithreptus atricapillus mallee*) were met with. Among the plants were orchids and grevilleas. It was a great pity that more time could not have been given to the exploration of this fine peak, for, without doubt, the thick scrubs would have yielded good material. This is a spot for the next naturalist who may go that way.

On the 15th the party split up and went out in many directions. In company with the host, I set out on horseback to the north, over very mountainous country. We were in search of a rare acacia. It was found growing in a limited area, on the top of a very high ridge which connects two mountain ranges. From here the view on every side was wild and grand; the pine-clad sides of the mountains only wanted a little snow to make an Alpine scene. Away to the north lay a great mass of pine-clad mountains, divided by deep ravines, the latter being traced by the growth of red gum trees. This is a virgin country as far as the naturalist is concerned, rarely, if ever, visited by a white man. Some day I hope to explore it. In some places grass-trees (*Xanthorrhæa*) were seen growing on the lower slopes, last year's flower-spikes standing out dark and gaunt against the sky. Having collected many botanical specimens, we began the homeward journey. In places we had to dismount—the descents were so precipitous.

All those interested in geology next day drove over to the Blinman mine; others worked the country around the homestead. On the 17th all left for Oweenagin's Gap, and we camped for lunch at a picturesque spot called the "Duke's Nose." A great mass of rock bears a remarkable resemblance to a human face, with a strongly-defined nose. A large creek lined with fine red gums finds its way through this gap. The valleys were clad in pine forests, and these trees grew far up the mountain sides. Birds were not plentiful; the only species met with in the pine forests were the White-browed Babbler (*Morganornis superciliosus*), Southern Rufous-breasted Thickhead (*Lewinornis rufiventris inornatus*), and the Broad-tailed Tit (*Acanthiza apicalis*). Among the gums lining the creeks there was more bird-life, for, in addition to the three species mentioned, South Australian Pardalotes (*Pardalotinus striatus subaffinis*) were plentiful; so were the Greenish Tree-Tits (*Smicrornis brevirostris viridescens*). Cloncurry Honey-eaters (*Ptilotula penicillata leilavalensis*) were also fairly numerous among the gum-trees. The flora did not vary much;



"The Duke's Nose," Oweenagin's Gap, Flinders Ranges.



Scene in Flinders Ranges, Creek in Foreground.



in addition to the pine and red gum, some of the more rounded hills were covered in porcupine-bush (*Triodia*). This prickly plant is more often, and incorrectly, called "spinifex." Grass-trees (*Xanthorrhoea*) were met with in isolated colonies. Mrs. Rogers, one of our botanists, collected some orchids in this locality, but Dr. Rogers (the renowned authority on this family of plants) identified the species as being found elsewhere. A few species of the acacia family and some salsolaceous plants, with a few species of grasses (some indigenous, others introduced), made up the flora of the district.

At an early hour on 18th October a start was made for the railway line. The party travelled in two four-horse conveyances. The horses started off at a rattling pace. The morning was bright and clear; the scenery through the ranges was very fine. Mountainous country opened out before us, till the furthest peaks were lost in the blue mist of the distance. Many acacias were in full bloom, and the yellow masses enlivened the landscape. As soon as we left the ranges and drove out upon the plains dust and sand rose around us in a cloud. When we entered Parachilna railway station it was quieter than I had ever seen it, although some railway people said the usual dust storm had been raging at 7.30 a.m. that day. The sand is always shifting around the station, and if anything, such as a vehicle, is not used for a day or so it has to be dug out. Having bade farewell to our kind host and hostess, we boarded our reserved carriage, and as we moved off three ringing cheers were given for the owners of Moolooloo. The journey to Quorn was not pleasant, for dust enveloped everything. The next day's journey was more enjoyable, for our eyes could feast on waving fields of corn, becoming golden in the head, and in many places the binders were at work. Towards evening the sweet scent of new-mown hay was wafted through the open carriage windows. These scenes of plenty continued almost to the city.

The trip was most enjoyable and profitable, and much material in many branches of science was collected. The ornithology of the ranges was interesting, and a new bird was discovered. The list of birds identified should be of more than passing interest, for it is the first made in that locality, in a range which finds its way for a considerable distance into the dry interior, thus enabling coastal forms to mingle with the interior ones. A fair number of insects was taken, many being new to science. The botany was varied, and some good collections were made, which are not yet worked out. Geologists and photographers put in some sound work, and are now busily studying material secured.

Too much praise cannot be given Mr. and Mrs. Lindo for having afforded scientific research such a helping hand.

Following is a list of the birds identified at Moolooloo. The nomenclature is according to G. M. Mathews, "A List of the Birds of Australia," 1913; the name in parentheses is that of the "Official Check-list."

**Phaps chalcoptera**, Latham. Bronze-winged Pigeon.—Not plentiful. An occasional bird was flushed from under the acacia trees, where it was in search of fallen seed. Also seen at the water in the evenings.

**Ocyphaps lophotes**, Temminck. Crested Pigeon.—Not plentiful in the ranges, although found in numbers on the plains near water.

**Lobibyx novæhollandiæ**, Stephens (*Lobivanellus lobatus*). Spur-winged Plover.—These birds were in great numbers in the hilly country, where they had nested, for many fully-fledged young birds were running about with the parents, which were making a great fuss.

**Elseya melanops**, Vieillot (*Ægialitis nigrifrons*). Black-fronted Dottrel.—One specimen seen on permanent water.

**Burhinus magnirostris**, Latham (*Edicnemus grallarius*). Eastern Stone-Plover.—Heard calling, but not seen.

**Notophox novæhollandiæ**, Latham. White-fronted Heron.—A solitary bird seen occasionally near water-holes.

**Anas superciliosa**, Gmelin. Black Duck.—Found breeding, although there were no waters of any great extent.

**Urospiza fasciata**, Vigors and Horsfield (*Astur novæ-hollandiæ*). Australian Goshawk.—Seen once or twice, but not a common bird. Found breeding.

**Accipiter cirrocephalus**, Vieillot (*A. torquatus*). Collared Sparrow-Hawk.—Only one bird seen.

**Uroaëtus audax**, Latham. Wedge-tailed Eagle.—Only a few examples of this fine bird were seen; they are becoming fewer in numbers each year. Mr. Lindo bears out the contention that they do more good than harm.

**Notofalco subniger**, Gray\* (*Falco subniger*). Black Falcon.—Only one bird seen, flying low over a gum creek.

**Ieracidea berigora**, Vigors and Horsfield. Brown Hawk.—These birds were very plentiful in the ranges, which is not to be wondered at, for they are found in numbers throughout the north.

**Cerchneis cenchroides**, Vigors and Horsfield. Nankeen Kestrel.—Seen on many occasions.

**Spiloglaux boobook marmorata**, Gould (*Ninox ocellata*). Marbled Owl.—Although not seen in the day-time, this bird was heard calling very often at night.

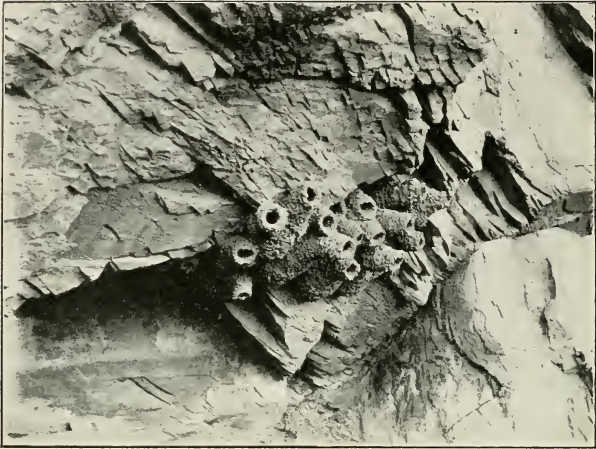
**Ducorpsius gymnopsis**, Sclater (*Cacatua gymnopsis*). Bare-eyed Cockatoo.—Met with in flocks of from two or three to twenty, keeping to the big gums in the creek, where they had nests. The seeds of a small pie-melon seemed to be their chief food at the time of our visit, although acacia seeds were seen in crops dissected.

**Eolophus roseicapillus**, Vieillot (*Cacatua roseicapilla*). Rose-breasted Cockatoo.—These handsome birds were met with in large flocks, but we did not see any signs of nesting.

**Barnardius barnardi lindoi**, S. A. White.\* Lindo's Ring-neck Parrot.—This new sub-species is quite distinct from the Mallee form, the coloration of the entire body differing. In habits and its habitat this

\* *S. A. Ornithologist*, vol. ii., part 5.





Nests of Fairy Martin.

FROM A PHOTO. BY J. W. HOSKING.



Typical Gum-tree Creek in Flinders Ranges.

FROM A PHOTO. BY CAPT. S. A. WHITE.

bird resembles *B. zonarius* more than *B. barnardi*. The female differs very markedly from the male. The yellow band on the first year's plumage of the young is much mottled with deep red. Found all along the gum creeks, but never any distance away from them. Stomachs were much distended with green acacia seeds.

**Psephotus varius rosinæ**, Mathews (*P. multicolor*). Southern Many-coloured Parrot.—Not a common bird; thinly distributed through the ranges.

**Cyanalcyon pyrrhopygius**, Gould (*Halcyon pyrrhopygius*). Red-backed Kingfisher.—Only one specimen came under notice.

**Cosmærops ornatus**, Latham (*Merops ornatus*). Australian Bee-eater.—This beautiful bird was fairly numerous, but no signs of nesting were observed.

**Heteroscenes pallidus**, Latham (*Cuculus pallidus*). Pallid Cuckoo.—The familiar call of this bird was heard several times.

**Owenavis osculans**, Gould (*Mesocalius osculans*). Black-eared Cuckoo.—Several of these birds were seen in the low scrub; they were very silent.

**Neochalcites basalis mellori**, Mathews (*Chalcococcyx basalis*). Narrow-billed Bronze-Cuckoo.—Often heard calling, and a specimen was secured; did not show any variation from the Southern bird.

**Hirundo neoxena**, Gould. Welcome Swallow.—Many were about the homestead.

**Cheramœca leucosternum stonei**, Mathews. Eastern Black-and-White Swallow.—Numbers seen upon the wing.

**Lagenoplastes ariel**, Gould (*Petrochelidon ariel*). Fairy Martin.—These Martins were very plentiful, and their retort-shaped nests were seen under ledges of rock in many localities, always close to permanent water.

**Whiteornis goodenovii**, Vigors and Horsfield (*Petroica goodenovii*). Southern Red-capped Robin.—These pretty little birds were often met with in the scrub, always in pairs.

**Melanodryas cucullata vigorsi**, Mathews (*M. bicolor*). Southern Hooded Robin.—Not plentiful. A specimen secured agrees with those collected both north and south.

**Smicrornis brevirostris viridescens**, Mathews. Greenish Tree-Tit.—Very plentiful, and their loud note was heard coming from the tops of the river red gums. The skins secured show little or no variation from those of the Mallee form.

**Lewinornis rufiventris inornatus**, Gould (*Pachycephala rufiventris*). Southern Rufous-breasted Thickhead.—These birds were fairly plentiful all through the ranges. The beautiful musical call of the male bird was often to be heard, and it seemed more full and liquid amid the rocky defiles. Upon comparing specimens it is found that this bird is a link between the coastal form and the Central Australian one. The latter bird I have described as *L. r. maudeæ*.\* I was surprised to find that this Flinders Range bird has the black band across the chest very well defined along the sides of the neck through the eye to the base of the bill, even more so than in the coastal form.

\* *Transactions of Royal Society of S.A.*, vol. xxxix., 1915.

The Central Australian bird which I have described as above has the ear coverts and lores grey. The Flinders Range specimens have thick, strong bills, like the coastal form. They agree with skins collected by me in the Gawler Ranges in 1912.

**Leucocircia tricolor**, Vieillot (*Rhipidura motacilloides*). Black-and-White Fantail.—Thinly distributed through the ranges.

**Coracina novæhollandiæ melanops**, Latham (*Graucalus melanops*). Black-faced Cuckoo-Shrike.—Only a few of these birds were seen. A female secured showed very little black about the face.

**Lalage tricolor swainsoni** (*Campephaga humeralis*). White-shouldered Caterpillar-eater.—A number seen, all in full breeding plumage.

**Drymodes brunneopygia**, Gould. Scrub-Robin.—I was much surprised to find this species. Upon comparison it was found to be identical with the Eyre Peninsula form. Fully-fledged young were accompanying the parent birds. The Scrub-Robin was seen only at the foot of Mount Patawarta, 3,060 feet.

**Pomatostomus ruficeps**, Hartlaub (*Pomatorhinus ruficeps*). Chestnut-crowned Babbler.—Very few seen. A nest and eggs were taken, also young birds in first year's plumage. Specimens seen were very shy.

**Morganornis superciliosus**, Vigors and Horsfield (*Pomatorhinus superciliosus*). White-browed Babbler.—A very common bird, seen in every situation. Many nests noted.

**Parephthianura tricolor**, Gould (*Ephthianura tricolor*). Tricoloured Chat.—Numerous in the open bush country. A nest containing large young was found.

**Acanthiza pusilla hamiltoni**, Mathews. Red-rumped Tit.—Not a common bird; a few pairs seen.

**Acanthiza pusilla apicalis**, Gould (*A. apicalis*). Broad-tailed Tit.—A few birds, generally in pairs, were found in the dry pine forests. They were moving about in search of insects, uttering hardly a sound.

**Geobasileus chrysorrhous addendus**, Mathews (*A. chrysorrhous*). Port Augusta Yellow-rumped Tit.—Numerous, moving about in small parties, uttering the usual lively little call. Upon comparing this bird with the co-type (which was collected by me at Port Augusta in 1912), the only variation shown is that the Port Augusta form has the markings on the forehead more pronounced.

**Pyrholaemus brunneus**, Gould. Redthroat.—A fair number of these little songsters was seen in the low scrub on the side of the hills. A nest with two eggs and an egg of the Black-eared Cuckoo was seen.

**Hallornis cyanotus**, Gould (*Malurus cyanotus*). White-winged Wren.—Only one seen.

**Leggeornis lamberti assimilis**, North (*Malurus assimilis*). Purple-backed Wren.—Very few seen; they were very timid.

**Campbellornis personatus munna**, Mathews (*Artamus personatus*). Masked Wood-Swallow.—A number seen; appear to be migratory. The herbage had been infested with caterpillars a week or two before our visit, and these birds were preying upon them.

**Campbellornis superciliosus**, Gould (*Artamus superciliosus*). White-browed Wood-Swallow.—A large flock was seen flying very high.

**Pseudartamus cyanopterus**, Latham (*Artamus sordidus*). Wood-Swallow.—Fairly plentiful in the ranges.

**Colluricincla harmonica victoriæ**, Mathews. Victorian Grey Shrike-Thrush.—Numerous; breeding.

**Grallina cyanoleuca**, Latham (*G. picata*). Magpie-Lark.—A few seen among the gum-trees in the creeks.

**Oreoica cristata**, Lewin. Crested Bell-Bird.—Met with on several occasions, but not common. Those seen were hopping over the ground, and were very silent.

**Aphelocephala leucopsis**, Gould. Whiteface.—Fairly common. It is surprising to find this species so far north, for *A. castaneiventris whitei*, Mathews, is found a little further north.

**Austrodicæum hirundinaceum**, Shaw and Hodder (*Dicæum hirundinaceum*). Mistletoe-Bird.—One bird seen.

**Pardalotinus striatus subaffinis**, Mathews (*Pardalotus striatus*). South Australian Pardalote.—Common. Found only along the gum-tree creeks. Resembles the Central form, *P. s. finkei* (Mathews), very much, but differs in having a darker upper surface and less buff on the rump.

**Melithreptus atricapillus mallee**, Mathews (*M. brevirostris*). Mallee Brown-headed Honey-eater.—Not plentiful.

**Gliciphila melanops chandleri**, Mathews (*G. fulvifrons*). Victorian Tawny-crowned Honey-eater.—Only a few birds met with.

**Certhionyx variegatus**, Lesson (*Lichnotentha picata*). Pied Honey-eater.—A small party of these birds was seen in the ranges feeding in the *Eremophila* bushes. An adult male and two immature birds were secured; the latter had the whole of the under surface creamy white, thickly spotted with blackish-brown spots. They were a pair, and the male could be easily picked out owing to the stronger markings. The erratic movements of this bird were very pronounced; this I had already noticed in the north-west of Central Australia.

**Meliphaga sonora**, Gould (*Ptilotis sonora*). Southern Singing Honey-eater.—Not plentiful; still, they were thinly distributed through the ranges. Specimens taken show no variation from the coastal bird, nor do they differ in any way in their note.

**Lichenostomus plumulus ethelæ**, Mathews (*Ptilotis plumula*). Southern Yellow-fronted Honey-eater.—Numerous all through the country. Specimens taken agree with the co-type, which was collected by me near Port Augusta in 1912.

**Ptilotula penicillata leilavalensis**, North (*Ptilotis penicillata*). Cloncurry. White-plumed Honey-eater.—Fairly numerous among the gums along the creeks. Specimens taken agree with the Central Australian bird, with the exception that they do not show black behind the white pencilling.

**Myzantha flavigula**, Gould. Yellow-throated Miner.—Very numerous all through the ranges. This bird does not seem to vary, although it is distributed over thousands of miles.

**Acanthogenys rufogularis cygnus**, Mathews. Southern Spiny-checked Honey-cater.—Only one or two birds seen; no specimens taken.

*Anthus australis adalaidensis*, Mathews. Southern Pipit.—These birds were fairly numerous through the ranges, and were breeding at the time of our visit.

*Corvus coronoides perplexus*, Mathews. Southern Raven.—A few birds were seen, but they were far too wary to come within gunshot.

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## Royal Australasian Ornithologists' Union.

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### ANNUAL REPORT, 1915.

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LADIES AND GENTLEMEN,—Your Council has much pleasure in presenting to you its Fifteenth Annual Report.

As our country has suffered so severely from the drought, and the Council considered that all our energies and spare cash should go towards helping the nation in its time of need, consequent upon the dreadful war, it was unanimously decided by the Council to postpone the annual congress, fixed for Queensland, and to do the business of the session by correspondence.

During the preceding twelve months eighteen new members have been enrolled, and, for various reasons, twelve members have been removed from the roll.

Mr. F. M. Littler, Dr. Hamlyn Harris, and Mr. B. Woodward have resigned as local state secretaries, and Messrs. E. M. Cornwall (Queensland), W. L. May (Tasmania), and W. B. Alexander (Western Australia) have been elected in their place.

The honorary secretary, Mr. G. Finlay, and the press correspondent, Mr. L. G. Chandler, both resigned to go to the war, and Mr. D. Le Souëf and Dr. Brooke Nicholls consented to carry on the work.

Mr. A. J. Campbell was elected as associate co-editor, and Mr. A. E. Le Souëf was elected on the Council in the place of Mr. B. Woodward, who had resigned.

The Council has again to record its indebtedness to Colonel Charles Ryan for his kindness in placing his rooms in Melbourne unreservedly at the disposal of the Council for its meetings during his absence at the seat of war. The best thanks of the Council are also due to the Royal Zoological and Acclimatisation Society of Victoria for their continued kindness in housing the Union's library.

The Union's official journal, *The Emu* has been kept up to its usual standard of excellence, despite the financial drawbacks, and many interesting and scientific papers have been published. H. L. White, Esq., of "Belltrees," Scone, generously offered to pay half the cost of a coloured illustration in each issue, and other members have subscribed the balance of the sum needed. The Council gratefully records its appreciation of such interest in and support of scientific ornithology.

The publication of a new edition of the British Ornithologists' Union's "List of British Birds" has necessitated the revision of

the Union's "Official Check-list of Australian Birds." By an almost unanimous vote, members have decided in favour of a second edition of the "Official Check-list."

Members also voted to increase the "Check-list" Committee from seven to twelve, and to divide the work. Eighteen names were suggested, and the following twelve were elected:—Messrs. Charles Barrett, A. J. Campbell, Basset Hull, Robert Hall, Dudley Le Souëf, Gregory M. Mathews, A. H. E. Mattingley, and H. L. White, Drs. J. A. Leach and W. Macgillivray, Colonel W. V. Legge and Captain S. A. White.

The library continues to increase, additions being mostly ornithological publications from other parts of the world.

D. LE SOUËF, Hon. Sec.

## Donations—Coloured Figure Fund

(TO JUNE, 1915).

<i>Victoria—</i>		<i>Queensland—</i>	
E. G. Austin	... £0 5 0	N. Geary	... £0 4 6
H. W. Ford	... 0 5 0	Sep. Robinson	... 0 1 6
G. Graham	... 0 5 0		
Wm. Lawford	... 0 5 0	<i>South Australia—</i>	
Dr. W. J. Long	... 0 5 6	Miss H. L. Sanderson	0 5 0
Miss A. Pike	... 0 15 0	Capt. S. A. White	... 1 0 0
Thos. Tindale	... 0 6 0	Mrs. S. A. White	... 0 4 6
		<i>Tasmania—</i>	
<i>New South Wales—</i>		Miss M. Brumby	... 0 5 0
H. Burrell	... 0 10 6	Col. T. M. Evans	... 0 5 0
Mrs. H. Burrell	... 0 10 6	Col. W. V. Legge	... 0 5 0
Dr. E. W. Ferguson	... 0 5 6	A. W. Swindells	... 0 15 0
John G. Gray	... 0 15 0		
			£7 13 6

## Bibliographical Note.

FOR the information of members, some of whom do not possess the earlier parts, the following particulars regarding *The Emu* are given:—Vol. i. (1901-2), 3 parts; vol. ii. (1902-3), 4 parts; vol. iii. (1903-4), 4 parts; vol. iv. (1904-5), 4 parts; vol. v. (1905-6), 4 parts, with supplement to Part 2; vol. vi. (1906-7), 4 parts; vol. vii. (1907-8), 4 parts, with supplement to Part 3; vol. viii. (1908-9), 5 parts (5th part special); vol. ix. (1909-10), 4 parts; vol. x. (1910-11), 5 parts (3rd part special); vol. xi. (1911-12), 4 parts, with supplement to Part 3; vol. xii. (1912-13), 4 parts; vol. xiii. (1913-14), 4 parts; vol. xiv. (1914-15), 4 parts.

## RECEIPTS AND

For Year ended

RECEIPTS.		£	s.	d.	£	s.	d.
To	Balance—General Fund ... ..	33	16	6			
"	" Coloured Figure Fund ... ..	11	2	2			
					44	18	8
"	Subscriptions—Arrears ... ..	36	5	0			
"	" Current ... ..	140	5	0			
"	" Advance ... ..	15	0	0			
"	" Check-list ... ..	4	8	0			
					195	18	0
"	Sales— <i>The Emu</i> ... ..				11	3	0
"	Exchange, £1 5s. 9d. ; Interest, £1 14s. 11d.				3	0	8
"	Donation, H. L. White, Blocks ... ..				5	8	7
"	Donations—Coloured Figure Fund ...	7	13	6			
"	Melbourne Lecture " ... ..	4	10	0			
"	Advertisements (2 years) " ... ..	5	0	0			
					17	3	6
					£277	12	5

## ASSETS AND

At 30th

ASSETS.		£	s.	d.	£	s.	d.
Savings Bank—Cr. Balance ... ..					92	2	10
Subscription Arrears (estimated good, say)		30	0	0			
Less Prepaid ... ..		20	5	0			
					9	15	0
Library ... ..					25	0	0
Illustration Blocks (estimated value, say) ...					20	0	0
<i>The Emu</i> in Stock " " ... ..					200	0	0
Tent and Material and Punch ... ..					3	17	6
					£350	15	4

Z. GRAY, L.C.A., *Hon. Treasurer.*

MELBOURNE, 1st July, 1915.



## Nesting Habits of the Mistletoe-Bird (*Dicaeum hirundinaceum*).

BY S. A. LAWRENCE, R.A.O.U., AND R. T. LITTLEJOHNS, R.A.O.U.,  
MELBOURNE (VIC.)

DURING October and November, 1914, we had an opportunity, for the first time, of observing the nesting habits of the Mistletoe-Bird (*Dicaeum hirundinaceum*). Previously we had seen the bird only on a few occasions, and never at close quarters. The nest we had under notice, unfortunately, could not be visited during the period of incubation, but we spent a good deal of time photographing and taking notes when the young birds appeared.

On 4th October, while photographing at the nest of a Yellow-breasted Whistler (*Pachycephala gutturalis*) on a timbered hillside at Ferntree Gully, Victoria, we noticed a male Mistletoe-Bird attacking a White-eye (*Zosterops dorsalis*) with such persistence as to indicate that the former was nesting. Several times the White-eye returned to a native cherry tree (*Exocarpus cupressiformis*), and each time was angrily driven away. Finally, both birds were lost to sight among the trees. As a photograph of the *Dicaeum* had long been desired, we kept a very sharp look-out. Soon the female Mistletoe-Bird arrived with nesting material, and flew straight to a sapling a few yards from the disputed cherry tree. On following her to the sapling, much to our delight we discovered the purse-like nest suspended from a horizontal branch about 10 feet from the ground. We watched from a short distance while the female made two or three more visits. The nest was very elastic, and bulged in an alarming manner as the bird turned about inside, arranging the fresh material. A closer inspection later showed that it was almost completed, and was much larger than descriptions had led us to believe was usual with nests of the kind. Certainly, it was much larger than the specimen now in the Melbourne Museum. The nest, which faced the north, was built of sheep's wool and the woolly substance obtained from the under side of the leaves of the blanket-wood tree (*Bedfordia salicina*). Although we remained at the spot for a considerable time longer, the bird did not again return, and we were rather concerned as to whether we had caused her to desert. The male appeared to take no part in the nest-building, but confined his attention to clearing his domain of feathered intruders.

It was not till 22nd October that we were again able to visit the hill. We were relieved to find that the nest had survived the severe gales which had been experienced in the interim, and that three young birds had been hatched some few days before. In the short period available for observation on this occasion, the female made several visits with food at intervals of, roughly, two minutes. She invariably flew into the sapling a few feet above it before clinging to the front of the nest to feed the young. As we were only a short distance away, we were able to see that the



Female Mistletoe-Bird at Nest.



Male Mistletoe-Bird Feeding Young.

FROM PHOTOS BY R. T. LITTLEJOHNS.



food consisted of insects only. The male was not seen at all, and the wariness of the female did not leave us very hopeful as to the possibility of obtaining photographs. A few days later we were early on the spot, provided with fencing rail and string for the erection of a staging on which to set the camera. The primitive nature of this structure appeared rather to amuse Mr. Charles Barrett, who arrived later in the day. However, it served its purpose, and eventually we had the cameras focussed on the nest. As we had expected, the birds were somewhat alarmed, and, though the female several times came to within a couple of feet of the nest, a few hours elapsed ere it summoned sufficient courage to brave the camera. When it had satisfied itself, after a great deal of hovering and hesitation, that the strange-looking object was harmless, the bird finally clung to the front of the nest in the desired position. Our difficulties, however, were not even now at an end, as, although, from this onwards, the female visited the nest frequently, her lightning-like movements prevented us from making a satisfactory exposure. On her arrival, she fed the young with her head inside the nest, and left immediately.

We had to resort to a plan usually adopted by us in the case of closed nests. The opening was blocked up with a piece of paper, thus preventing the young birds being fed. The parent was so taken aback on her return that she remained for several seconds in a suitable position. She did not at all appreciate the altered aspect of her home, and clung to the front, scolding harshly. Mr. Barrett and ourselves were then able to expose several plates. The male bird was too wary to be photographed, and at this time we were of the opinion that it took no part whatever in feeding the young. On two or three occasions during the day the male came to within a few feet of the nest, but brought no food. We left the hillside that evening fairly satisfied with our day's results, but more than ever determined to obtain pictures of the male if possible.

A week later we were again at the nest, notwithstanding unfavourable weather. The young birds, which had grown considerably, called lustily in answer to their parents. They were also strong enough to cause a good deal of trouble by pushing the piece of paper from the entrance of the nest. On this occasion, much to our surprise and satisfaction, the male fed the fledgelings as often as the female did, thus completely upsetting our former conclusions. The male very quickly became accustomed to the camera, but, instead of clinging to the front of the nest, persisted in hanging head downward from the branch above. For some time at a stretch each bird brought food to the nest on an average once in about four minutes. There were occasions, when the brood was evidently well satisfied, on which both birds remained away for as long as a quarter of an hour. The male bird especially, often choosing a prominent position in a neighbouring tree, would remain for some time uttering a short, sweet strain, not unlike that of the White-eye. On this day, also, the young were fed on insects.

We were naturally very pleased at having been able to photograph both birds; but, as the conditions had been so unfavourable, we decided to devote the following Tuesday (a holiday) to further observation. This proved to be the most interesting and profitable day of all. Nine o'clock in the morning found the improvised staging again erected before the nest. The birds by this time seemed to take these untoward happenings as a matter of course, and we were able to start operations without delay. The young birds were well feathered, and it was difficult to prevent them from scrambling out. They resented the blocking out of daylight, and fought so strenuously as to cause us some misgivings for the safety of the nest, which was showing a little weakness at the narrow portion through the action of the weather. Both parents again took part in feeding the young, and we were surprised to find that this day the food consisted almost wholly of the sticky *Loranthus* berries, devoid of the outer case. Insects were brought only about once in each six visits. The berries were obtained very quickly from mistletoe growing on the trees near by, most of which were badly affected with the parasite. The female usually brought one fruit only at a time, while the male frequently brought two, and sometimes three. The parents themselves also fed on the berries, both when among the mistletoe and when prevented for any length of time from feeding the chicks. After taking several photographs of the parent birds at the nest we removed the young, in order to make some exposures under less difficult conditions. The adults soon became used to the change, and perched on a convenient stick near the imprisoned brood. They had lost all fear of the camera and of ourselves, and took berries from a small mistletoe branch held out to them. We were then able to see exactly how the berries were extracted from the case. We already knew, by observing the empty cup-shaped portions of the cases attached to the mistletoe, that the seed was extracted without the berry being first plucked from the parasite. We now found that the ripe berry was taken crosswise in the bird's bill, and the soft case split in halves by pressure. The free portion of the case was then dropped, leaving the white berry protruding from the half still attached to the branch. By pressure of this remaining half between the mandibles the seed was forced out sufficiently to allow of its being easily taken in the bill. The birds could not be persuaded to take unripe berries. During the time that berries were to be obtained so near at hand we noticed that one of the fledgelings, much weaker than the others, was neglected time after time when they were being fed. We took pity on the weakling, and placed it where we thought it would be more likely to receive attention. Evidently, however, the neglect was intentional, and it was fed very little. At the time we were inclined to think that this apparent neglect accounted for the bird being a weakling, but it occurred to us afterwards that possibly it was fed on insects only, and passed over when berries were brought. This would appear likely from the fact



Male Mistletoe-Bird, with Mistletoe Seed in Beak.



Female Mistletoe-Bird Feeding Young.



that all were fed on insects when very young, and on berries only as they became larger and stronger. The *Loranthus* seeds evidently passed through the systems of the young birds very quickly, and were unharmed.

As the birds had become so trustful, we thought that it would be a pity to leave without taking some pictures which would illustrate how accustomed even shy birds will in time become to the presence of anything unusual. With very little trouble we induced the female to perch on our hands and feed the young. Similar photographs of the male could have been obtained had it not been that the day was far spent and the light useless for further camera work. After putting the young birds back in the nest and covering up our tracks in the vicinity as much as possible, we left the birds to enjoy the peace they deserved.

Some two months later we again visited the spot, and took the remains of the nest for closer examination. We also examined some *Loranthus* seeds which had passed through the young birds and had lodged on the branch of a sapling. All had firmly adhered to the branch, and had sent out small shoots. From our observations it would appear that, without doubt, the Mistletoe-Bird must be a very important factor in the spreading of *Loranthus*. We have watched other birds among the branches of the parasite when in fruit, but have not seen any of them eat the berries. On 1st November, 1915, just a year after our previous observation, we noticed that the *Loranthus* on the same hillside had not finished flowering. Some berries were forming, but none was nearly so far advanced as those noticed the same time last year. We observed two different pairs of Mistletoe-Birds feeding on the ripe berries of the native cherry tree; White-eyes and Yellow-faced Honey-eaters (*Ptilotis chrysops*) were doing the same. The berries were pulped for some time in the bill, and swallowed with the seed attached. The Mistletoe-Bird, however, appears to favour the *Loranthus* berries when they are available, as, during our observations last year, they did not eat the berries of the native cherry, although the tree, within a few feet of the nest, was in full fruit.

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## Notes upon the Yellow-mantled Parrot (*Platycercus splendidus*, Gould).

By H. L. WHITE, R.A.O.U., BELLTREES (N.S.W.)

(Read before the Bird Observers' Club, 10th November, 1915)

SINCE the time when Gould described this bird, in 1845, from a specimen secured by Gilbert in the Darling Downs district of Queensland, no further knowledge appears to have been gained of its range or its habits. I am therefore venturing on what is practically new work. Authorities evidently took it for granted that *Platycercus splendidus* was a rare bird, of very restricted range; my observations tend to prove the contrary.

Although the two forms, *Platycercus splendidus* and *Platycercus eximius*, are very closely allied, no one can imagine Gould mistaking them. How does it come about, therefore, that the first-named is now found at "Yarrundi," close to Scone, New South Wales, where Gould had his headquarters for some time, and which is so frequently mentioned in his books? In notes upon *Platycercus eximius* he remarks\* :—"It is found in great numbers in the district of the Upper Hunter." Such is not the case now, *Platycercus splendidus* being the local bird about "Yarrundi" and parts of the Upper Hunter north of that place. Gould apparently did most of his Upper Hunter collecting at "Yarrundi," three miles to the west, and "Segenhoe," five miles to the east of Scone, thence north to the Liverpool Range, this locality being now inhabited exclusively, as far as I can judge, by *Platycercus splendidus*. My collection contains skins obtained close to "Yarrundi" house, also from within the municipal boundary of the town of Scone.

As a boy, 35 years ago, I wandered over a very considerable portion of the Upper Hunter frontages, my people owning several large estates in the locality, and extending upwards of 30 miles both north and south of the town of Scone. I shot many "Rosellas," but cannot remember noting any which had the rich yellow colour of *Platycercus splendidus*. This is no proof, of course, but, taken in conjunction with Gould's statements, I am inclined to think that *Platycercus splendidus* is gradually moving south and displacing the Rosella, *Platycercus eximius*.

Before going further, it may be as well to explain to those who have not travelled over the Brisbane-Sydney railway that the Darling Downs district of Queensland adjoins the north-eastern corner of New South Wales. After leaving the border and coming south (in a direct line) about 60 miles, the town of Glen Innes is passed; another 60 miles brings us to Armidale, thence 60 miles to Tamworth, and a further stretch of 70 miles to Scone, which place I consider to be just about the southern limit of *Platycercus splendidus*.† How far west of the line the form extends I am unable to say, but not for any distance, I fancy. Fifteen miles south of Scone we have Muswellbrook, where *Platycercus eximius* is still the local form. Proceeding west from Scone, 30 miles in a direct line, Merriwa is reached; my skins show that *Platycercus eximius* is found there, while still further west, from Cobbora, Mr. T. P. Austin, R.A.O.U., has supplied me with many beautiful specimens of the same form, together with one skin of *Platycercus splendidus*. Mr. A. J. North quotes Cobbora as being a favourite haunt of *Platycercus eximius*, therefore we may safely place that bird as the local form.‡

Returning to Scone and going east, we find *Platycercus splendidus*

\* "Handbook," vol. ii., p. 56.

† From each of the above-mentioned towns I have specimens of *Platycercus splendidus*, and none of *P. eximius*.—H. L. W.

‡ "Nests and Eggs," vol. iii., p. 136.

plentiful at "Belltrees," 20 miles away, while it is noted also from the Manning, Bellinger, and Clarence Rivers, all east coast waters. With the exception of an abnormally coloured specimen procured at Foster,\* Mr. North does not mention *Platycercus eximius* from the north coast of New South Wales. If my observations be correct (the specimens speak for themselves), the whole of that part of New South Wales lying east of the Brisbane-Sydney railway line, as far south as Scone, is the habitat of *Platycercus splendidus*, while probably the bird does not extend very far west of the line.

Taking it for granted that Gould was correct in placing *Platycercus eximius* as our local bird at Scone, I did not pay much attention to the matter until the late severe winter, during which I fed the native birds in my garden. Gradually enticing the Parrots closer to the windows of my office, I at last induced the birds to feed from the verandah, where I first observed the dark yellow of the back feathers. A few specimens secured about a mile away convinced me that I was amongst *Platycercus splendidus* and not *Platycercus eximius*. I then approached friends in various localities north, west, and south of "Belltrees," with the interesting results stated above.

There is no doubt that the two forms are very closely allied, and many of the less brightly coloured birds are almost identical in shade; but a comparison of fully adult specimens shows differences which probably justify a sub-specific separation. The habits of the two forms are exactly similar, and the eggs are not separable.

I do not claim my deductions to be absolutely correct, but the above remarks may lead to further investigation, and the final clearing up of the mystery which has surrounded this interesting and "long-lost" bird.

{The re-discovery by Mr. H. L. White of the most beautiful Yellow-mantled Parrot is interesting, and demonstrates the value of close bird-observation in one's own district, as well as striving for knowledge in regions beyond.—EDS.]

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## Remarks on the Proposed Second Edition of the "Official Check-list of the Birds of Australia."

BY GREGORY M. MATHEWS, F.R.S.E.

IN the October *Emu* there appears an account of the proposition to prepare a second edition, and comments are made with regard to my work on the birds of Australia. I propose to make remarks here illustrative of my conclusions, so that an "intelligent vote" can be taken in connection with them.

Firstly, I wish to thank the writer for the kindly appreciation

\* "Nests and Eggs," vol. iii., p. 128.

of my work, but wish to emphasize the fact that the numerous emendations I have made in connection with the nomenclature and classification of Australian birds have all been towards the one end: the accurate and exact nomination of our study *without prejudice* in any manner. Consequently, my views have altered as I have found facts to disagree with accepted theories. It must be acknowledged that the student of ornithology must at first be guided by the work of his predecessor, and it is only by perseverance and thought that he can improve upon that work.

The one big point with regard to unanimity in generic names now outstanding is "one-letterism," and here I wish to explain my position, as it seems to be misunderstood. Reference to my writings will show that I now accept a view entirely opposite to my earliest one, and this is due to the one fact that I wish to accede to the wishes of the majority. A few historical notes may show the necessity of my action.

When the British Association Code for the adjustment of nomenclatural troubles was promulgated some 75 years ago, natural science was in its infancy, and the rules there proposed were not constructed with a view to posterity. The makers were all students of many phases, and could scarcely be called specialists. The Code admitted the correction of "supposed" grammatical erroneous construction of names, and consequently this was taken advantage of. This Code was known as the "Stricklandian" Code, as a clever man called "Strickland" was the secretary and compiler of the code. Strickland himself was far-sighted enough to see the danger in this matter, but, as the majority of workers disliked the idea of "inaccurate" nomination, he commonly indulged in the proposed correction of names. Thus, to cite the case of "*Meliphaga* v. *Melophagus*," we will suppose the former was constructed from two Greek words—*melos* and *phagos*, meaning honey and sucker. The first combination is either wrongly or rightly formed, according to the grammatical rules governing the transliteration of Greek words into Latin and also the combination of words. The Stricklandian Code admitted, or rather advised, the emendation of such incorrectly formed or wrongly transliterated words. Thus, whichever were the earliest *in date*, it invalidated *any* later combination, as all the combinations were amenable to alteration until they agreed. I have cited an instance of such emendation, and here again give it. A worker proposed a name, *Chroicocephalus*. Working with the Stricklandian Code, various writers indicating errors of transliteration and combination suggested *Kroicocephalus*, *Kroikocephalus*, *Chroicocephalus*, *Chroecocephalus*, and *Chroocephalus*. It was subsequently proved that the first proposer had *correctly* formed the word, and it needed *no* alteration at all. I suggest that it would be impossible to maintain the preceding half a dozen combinations with any accuracy, *considering the students who are interested in ornithology*. I make this statement, as it has been argued that chemists not only utilize such similarly-formed

words, but also make a practice of them, differentiating hypsulphites and hyposulphates and ferro-cyanides and ferri-cyanides. Chemistry is, however, an *exact* science, and I can never imagine a man who can differentiate between  $C_{16}H_{16}N O_7$  and  $C_{16}H_{15}N O_7$  worrying at all about the *trivial* alterations in bird nomenclature one sees pages written about. Ornithologists have *seriously* argued about the "*confusion*" that would ensue through the alteration of a bird-name, so our science would never be ranked as an *exact* science. Again, it might be observed that all the arguments brought forward with regard to alterations in bird-names have been urged on account of the nature of the bird students.

However, to return to the matter of emendations. The acceptors of the Stricklandian Code were not imbued with foresight, and consequently treated the Code with carelessness, the excellent provisions therein contained being ignored and neglected, and chaotic condition became imminent. This was due to absolute prejudice against the real workers, and it was soon written that "the Stricklandian Code was more honoured in the breach than in the observance." The supporters of the Stricklandian Code were the British ornithologists of the last generation, and unfortunately the older members of the present generation are more or less prejudiced by the same inaccurate method of working. This is seen in the new B.O.U. list, where an attempt has been made to except some few names from the laws presumably accepted. The prejudice is seen in the fact that the committee would not accept the international laws implicitly, but decided to savour them with a little indecision. This result has provided the anticipated complications, as will hereafter be noted.

Reference to the international laws brings us to the last point. The Stricklandian Code was mainly a British proposition, and on the Continent similar codes were prepared, more or less based on that code, and differing in details only. In America an amended code was also prepared, while such action necessitated emendation of the first Stricklandian Code. The existence of these numerous codes provided the reason for an International Code, and this is what I now follow. As might be anticipated, the reconciliation of the various codes was not exactly successful in eliminating all the conflicting factors at the first time.

Therefore, the ruling with regard to "one-letterism" became a tentative one, no law being laid down, only a recommendation reading—"It is well to avoid the introduction of new generic names differing from one already in use only in termination or in a slight variation in spelling, which might lead to confusion. But, when once introduced, such names are not to be rejected on this account." This recommendation was in direct opposition to the usage of a century, and was consequently ignored. Further, the old codes, which were still commonly used wherever they did not exactly contradict the international laws, made exactly the opposite conclusion. In ornithology, Hartert, Hellmayr, and one or two

others accepted the recommendation as a law, and therefore reinstated a few names which had been rejected under the Stricklandian and other codes. I made the same alterations in my "Reference-list," but it has proved impossible to act up to this recommendation, as the number of names to be revived becomes multitudinous, and, furthermore, the numerous emendations would need consideration as separate words.

At the last Congress of Zoology a proposition was tabled to schedule the alterations necessary in the branches. Time did not permit the discussion of the matter, but it was easily seen that the only means of reaching unanimity was by the rejection of similarly-formed words—*i.e.*, workers' usage *in every branch* of zoological science would cause the absolute rejection of the recommendation quoted. When this was seen to be certain I at once proceeded to make the necessary emendations, and this action is the one which has called into being the note which I here comment upon.

It is noted in the October *Emu* that three changes depend upon this "one-letterism," but it is not stated how many depend upon the acceptance of the opposite course.

I would advise the adoption of the course I am now pursuing, as it is undoubtedly the one which *has* gained acceptance in *every* branch of zoology, and consequently the names maintained under this usage will be certainly approved by all future students.

1. Under this number is set out a number of generic names from the first R.A.O.U. "Check-list" which do not agree with those I at present use. I cannot here discuss in detail all the reasons for the acceptance or rejection of my choice, but would first point out that, while some names depend upon the generic limits, others are in a case where there is no other course save the acceptance of my choice. Such a one is *Irediparra*. *Parra* was provided by Linné for the Brissonian genus *Jacana*, which is a South American genus to which the Australian bird cannot possibly be referred. As *Parra* is an absolute synonym of *Jacana*, it cannot claim usage in any other connection. *Irediparra* is now commonly in use by writers such as Hellmayr, &c. Another is *Burhinus*. This name was provided for the Australian bird *before* *Edicnemus* was introduced for a similar European form. Were the two considered congeneric *Burhinus* has priority, but the International Commission on Ornithological Nomenclature has decided they are independent genera. In every manner, therefore, *Burhinus* must be used for the Australian bird.

Another kind of case is *Cirripidesmus*. The name used in the R.A.O.U. "Check-list," *Ochthodromus*, I have conclusively shown in "The Birds of Australia" to be inapplicable from a careful study of the bird, and, moreover, it is invalid on account of one-letterism in a rather definite manner.

A third case can be exemplified by *Austrotis*. The Australian bird was considered congeneric with the African, though the intervening Bustards were allotted to different genera. It was some-

what obvious that here we had a case of convergence of superficial characters, but comparison showed that these were not so close as might have been anticipated from the classification, and that superficially the birds could be generically separated.

If the Council would consider it acceptable, I would draw up the arguments, quite briefly, for and against the whole of the *thirty-five* names included in (1) for the consideration of the ornithologists of Australia, as it seems convenient to have in view the data dealing with these names before conclusions are arrived at.

2.—Names fixed by B.O.U. list.—Where the B.O.U. list is contrary to the international laws I do *not* counsel its acceptance. It should be remembered that the B.O.U. list is a tentative one, being the first attempt to reconcile the last (and few) supporters of the Stricklandian school with the more (and much more numerous) progressive students of British ornithology. So far my forecasts in connection with British ornithology have proved correct in a much quicker time than I anticipated, and I now provide another when I state that the next B.O.U. list will alter Nos. 3, 4, 5, 6 to the names I use, and which should be used in the new R.A.O.U. "Check-list." In the "'Check-list' genera (20), for which there is a valid prior name," appears three names which come under the article regarding "one-letterism"—

*Oxyura* should not be used instead of *Erismatura*.

*Coracina* should not be used instead of *Graucalus*.

*Lonchura* should not be used instead of *Munia*.

It is afterwards noted that many changes may be necessary on account of "one-letterism," and gives the list of names involved.

Would it not be wise to tackle the matter now *and make the changes necessary?* In usage the converse has proved impracticable, and my own as well as other workers' attempts to revive rejected names on this account have proved futile.

I would only make a comment upon the concluding sentences regarding the "generic" standard by pointing out that no comparison can be made with either the British list or the American list, *if facts be considered*. Both are dealing with a single faunal element, and to be correct the British list would only be comparable with a Tasmanian one. The British Isles are, zoologically, part of the Palearctic region, as Tasmania is part of the Australian region, with this difference: the Tasmanian avifauna is *more* differentiated from that of the mainland than the British is from that of the Continent. How many genera are represented in the Tasmanian avifauna, *on the "Check-list" basis*, in proportion to the species? The proportion would not compare with that of the British list.

I have repeatedly emphasized the fact, displayed by the study of other sciences, that there are *three* distinct faunal elements in Australian ornithology. This fact alone would compel a higher generic percentage in Australia than in North America, as well as Britain. I use names to express facts, not to hide them, and consequently more generic names are necessary in proportion in

the Australian than in the Northern places compared with them. Again, I have considered as "sub-species" very many forms which in the A.O.U. list are ranked as "species," and, further, more "sub-genera" are freely used in that list where I call the divisions "genera." When these facts are carefully taken into consideration my standard will be found little higher than that of the A.O.U. list; and I hope the Councillors who make a study of the B.O.U. list will bear in mind that comparatively-speaking small genera are there utilized, and only in rare instances (and then very often wrongly) are large groups used, *through the prejudice of convenience*, and *not* from a study of the birds themselves. As instance, *Sterna* and *Larus* may be quoted. If the B.O.U. list had accepted throughout the generic standard put forward by the inclusion of these two genera, all the *Passeriformes* might have been classed in *Fringilla*.

It is necessary, in order to arrive at generic values, to study the birds in monographic groups, and, moreover, the anatomy must be considered. Until this is done it is useless to dogmatize, and at the present time the only safe course is the acceptance of many genera rather than few. Personally, as I have shown in my "Reference-list," I have no prejudice; my only desire is to advance our science, and I will use large or small genera accordingly as they express the facts best. I, however, will not use a name for a bird which I *know* to be wrong, and that is where I differ from the compilers of the B.O.U. list.

I hope in the future to study the anatomy of Australian birds, and thereby settle absolutely the value of some of the genera, but I would draw attention to one of the most interesting facts on record. I made a careful and prolonged study of the Australian *Charadriiformes*, and from the examination of skins alone re-classified this group. My results were published in the "Birds of Australia." Dr. Lowe shortly afterwards reviewed the same group from the Palearctic forms, and arrived at similar conclusions, quite independently, to my own, under the osteological examination of members of the group. His results are now appearing in scraps in *The Ibis*, but so far he has *absolutely* confirmed the conclusions I put forward from my study of the skins alone. This is evidence in favour of the close study of bird skins and the approximate accuracy of the results thereby achievable.

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### Birds of a Murray Island.

BY CHARLES BARRETT, C.M.Z.S., MELBOURNE (VIC.)

DURING a brief holiday in November, 1915, at Kulkyne station, about 50 miles from Mildura, I spent many pleasant hours among the birds on a small island opposite the homestead. The Station Creek flows along one side, junctioning with an extensive billabong at the eastern end of the long strip of slightly elevated land, and with the Murray River at the other. The islet, which is the shape





Bower of Spotted Bower-Bird.

FROM A PHOTO. BY CHAS BARRETT

of a boomerang, is covered in parts with a prickly shrub locally known as "native box thorn"; here and there are small trees, acacias and eucalypts, and some fine old red gums along the water's edge, where rushes and grassy areas provide good cover for snakes. The birds of this islet were not numerous, but some were nesting, and interesting observations were made as I rambled around with field-glasses and camera.

In a space beneath a big clump of "box thorn" was the bower of a pair of Spotted Bower-Birds (*Chlamydera maculata*). Mr. C. Thompson, manager of the station, who is keenly interested in birds, stated that the bower had been there for several years, but had been shifted once a few yards. He had often seen the birds at their playing-place, running through the bower and tossing the bones, berries, and other objects about with beak or claws. I was not so fortunate as my host, but had a good view of a male Bower-Bird in a pepper-tree at the homestead. The collection of bright objects at either end of the bower was fairly large, and consisted principally of bits of weather-worn green and blue glass (from bottles), which formed a kind of mosaic on the hard, dry ground. There were a few glass stoppers from sauce bottles, a piece of perforated zinc, numbers of bleached sheep-bones, one or two green berries, twigs and leaves, an odd feather, and, in the very centre of the bower, a large pellet of lead. The bower itself was neatly and strongly built, and an excellent example of the architectural skill of *Chlamydera maculata*.

It is asserted that Bower-Birds are doing much damage in the orchards on some of the Murray blocks, and I was informed that many had been shot. The birds were reported to be plentiful at Piangil, and a settler complained that they had carried off a quantity of fencing staples which had been left along a line of newly-sunk posts. I fear that, in the course of a few years, unless measures are taken for their better protection, the Spotted Bower-Birds will share the fate of the Mallee-Fowls (*Leipoa ocellata*) in the Mallee country of Victoria.

In a bush close to the Bower-Birds' playground on the Murray islet a pair of Crested Pigeons (*Ocyphaps lophotes*) had a nest, about three feet above the ground. When I flushed the female the nest contained two eggs; next morning one had hatched, and a few hours later there were two chicks on the platform of twigs. The parent birds were shy. A footstep a few yards from the bush was sufficient to frighten the female, which went whirring from the nest to a dead tree some distance away, where she would remain perched while anyone was in the vicinity of her nursery. I tried on several occasions to photograph the brooding bird, but in vain. The camera was placed at the side of the bush opposite to the "avenue" approach to the nest, and was screened in branches. Then I walked away ostentatiously, in full view of the female perched in the dead tree. Hidden, I watched her through the glasses, but she remained calmly on her perch—a still figure on guard. Once or twice in the course of an hour the

Pigeon paraded the twisted grey limb to which she always flew on leaving the nest, and more often she gazed around as if searching for some hidden danger. I went for a walk, and returned to find the wary bird still on the dead tree, watchful and patient. There were several nests of the Crested Pigeon in the pepper-trees at the homestead, but my luck was no better there, though the birds were certainly less fearful than those of the islet. They, like the other native birds on Kulkyne, enjoy protection, and one can approach them closely. But the camera was new to the Pigeons of the pepper-trees, and none would face it. They wore out my patience, and at the end of a long afternoon I took the camera from a perilous position on a high bough and acknowledged defeat.

Several old nests of the Crested Pigeon were found in the bushes on the islet, but only one pair of the birds appeared to be breeding there this season. Crows, I learned, search diligently for the nests, and take toll of eggs and squabs. Possibly some of the nests that I saw had been robbed by the big birds. The wariness of the island Pigeons may be due partly to the persecution of Crows.

Many White-browed Wood-Swallows (*Artamus superciliosus*) were seen, and a nest was discovered in the slight hollow of a gum-tree stump. There were two eggs. The owners feared the camera, and I had to be content with a photograph of the nest and eggs. When examined again, two days later, the nest was empty, and it was safe to blame Crows for the robbery. In the horse paddock near the homestead hundreds of White-browed Wood-Swallows were observed in company, and big flocks were also seen in other localities, but no more nests came under notice. I concluded that the breeding season was practically over.

Nests of the White-browed Babbler (*Pomatorhinus superciliosus*) were common objects in the "box thorn" on the islet, and one that was examined contained eggs. Flocks of five or six Babblers were seen hopping through the bushes. In pairs, Red-backed Parrots (*Psephotus hæmatonotus*) flew from tree to tree, and doubtless broods had been reared in some of the hollows, for the species is abundant around Kulkyne homestead. The Yellow-vented Parrot (*P. xanthorrhous*) is also on my list of island birds.

In the long, soft grass by the creek-side a pair of White-eyed Ducks (*Nyroca australis*) had a beautiful nest, containing eleven eggs. Locally, this species is called the Widgeon. Black Ducks (*Anas superciliosa*) and Grey Teal (*Nettion gibberifrons*) had finished nesting, and on the waters of creek and river around the island the families were often seen. When a pair of Teal, with a brood of seven, was approached, the young birds scattered and hid in a clump of lignum. One of the parents also disappeared, but the other feigned distress, and flapped clumsily through the water, as if wounded, just ahead of the boat. We followed, and when the Teal thought that we were at a safe distance from her brood she rose and flew back to the spot where we had first seen the family.

Beside a huge dead red gum by the waterside we started a large lace monitor (*Varanus varius*), which splashed into the river and climbed a tree. In a hollow log about 20 yards distant a carpet snake (*Python variegatus*), at a guess 12 feet in length, had its home. The lizard certainly was an enemy to the birds of the island, and perchance the snake might be classed as a destroyer of nestlings. Safe from all such enemies was the nest of a pair of Welcome Swallows (*Hirundo neoxena*), built in the shell of a burnt gum-tree stump, standing in deep water. Swallows skimmed day long above land and water, and at dusk flocked to the homestead, where they harboured for the night under the verandah. That wide, cool verandah at Kulkyne, with the pepper-trees, tall and shadow-giving, in the yard beyond, was a fine place for a bird-observer at all hours, for the trees' visitors included Bower-Birds, Crested Pigeons, Parrots of several species, and other birds. The homestead, of course, is intimately associated with the island; birds weave invisible links between the two places as they come and go across the creek.

My observations on the Murray islet were neither systematic nor continuous, but I saw sufficient to realize that such places are favourite bird haunts, and would make good sanctuaries. At Kulkyne the birds are not molested, but all station people are not bird-lovers, else many species that are becoming rare would still be numerous.

In the vicinity of the island, on creek and river, Ducks and other water-loving birds were abundant, and during short voyages in a flattie I extended my acquaintance with the avifauna of the locality. The river was in flood, and one could travel for miles over inundated country into dim, mysterious regions among tall gum-trees, whose reflections in the still water were distorted by the quick passage of startled waterfowl; through flood-lakes, where Ibises and Herons were congregated and the silence was broken by harsh cries of nesting Cockatoos. I came to Kulkyne from Swan Hill on a river steamer, and all the daylight hours were pleasant, for never a mile of the voyage lacked interest—birds in view on every reach, and scenery of unflinching beauty.

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### Bird Life at Dumbleyung, W.A.\*

BY M. W. ELLIOTT.

**Yellow-plumed Honey-eater** (*Ptilotis ornata*, Gould).—This is one of the commonest birds in this district; it is to be found in timber and scrub country alike. Were it as large as a Magpie it might well be termed the "bush bully." Of all the feathered inhabitants of our scrubs, this bird, in my opinion, is the most pugnacious. You will perhaps see two or three picking

\* These notes from his correspondent, Mr. M. W. Elliott, of Dumbleyung, were forwarded by Mr. W. B. Alexander, M.A., Keeper of Biology, Perth Museum.—EDS.

at the flowers of a small salmon gum, in company with some more of the same tribe, and instantly a battle-royal follows for possession of the tree. Many times I have seen the bird fearlessly tackle a Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*), though usually, in this case, the sharp and strong beak of the Lorikeet has driven the smaller bird from some favoured bunch of blossom. The Honey-eater is always ready for fight, and the appearance of any other species is the signal for a set-to. Of all the birds which assemble at the common warning call on the appearance of a Hawk, none puts up a fiercer fight than *P. ornata*. Its notes are harsh, and, so far as I can learn, it has three distinct calls.

These birds breed from September onwards, though they are somewhat irregular in habits. The nest, composed usually of dry grasses and devoid of lining, is somewhat shallow, considering the size of the eggs. It is placed usually in mallee suckers or some convenient bush from three to six feet above the ground, but I have seen it placed high up in trees. Two years ago I was attracted by two of these Honey-eaters repeatedly flying to a salmon gum stump; the tree had been cut down, and the stump had sprouted. Much to my surprise, there was a nest containing a young Bronze-Cuckoo (*Chalcococcyx plagosus*), which the Honey-eaters were assiduously feeding. When I made a second visit to the nest the Cuckoo had grown to such an extent that it was sitting on the rim, the nest being hardly visible. I went a third time, and found that the occupant had completely outgrown its quarters, and was sitting gripping a branch with one foot and the side of the nest with the other. When I returned the bird had flown. This was the first time, either here or in New South Wales, that I had found a Bronze-Cuckoo in an open nest.

**Rufous-rumped Ground-Wren** (*Hylacola cauta*, Gould).—It has been my good fortune to make several observations of this shy, but interesting, mouse-like little bird. My first experience of it was five years ago. It was the first week of October, and I was engaged in fencing. The fence line, through thick mallee, had been cleared to a width of about 9 feet, the rubbish being thrown to the edge of the line, thus forming a continuous heap about 2 feet 6 inches high; it had been down some time, and was dead. I saw one of these birds go several times to a spot where the mallee tops were very thick, and there I found a nest attached to the small twigs. It was ready for eggs, but next day the Ground-Wrens were gone, and the nest destroyed; evidently my placing of a finger in the entrance to find out what the nest contained had upset the birds. The following year, at the end of September, I took a nest from a fence line on my own property. It was in an almost identical position to the other, except that the fence line was not so wide, and the nest was attached to a small green bush growing among the dead rubbish. Both the nests were within two feet of the ground. This one

contained three eggs, white, elongated, and with dark red spots towards the larger end.

These birds are somewhat scarce, shy, and difficult to approach. They seem to remain about the same patch of scrub for some time; in fact, I am not sure but what they make it their permanent abode unless interfered with, when they quickly depart. Of course, I cannot be sure whether they are the same pair, but in the patch of scrub referred to above I have seen a couple for over two years. You may travel for two miles round, and will not find another bird. They favour thick scrub of the stunted variety, and, while uttering a peculiar little note or call, hop and flit from point to point in a most amusing fashion. So small do the birds appear, and so quick are their movements, that they remind one of mice. They will suddenly cock up their tail, so that one obtains a glimpse of its red base. While flying they also exhibit it, but when annoyed or alarmed they spread the tail, and then it is that one obtains the best view of the colour.

In most patches of scrub there are clear spaces, sometimes 15 feet across, and when a Ground-Wren wishes to cross this it does so at a most astonishing rate, almost as though it were afraid of being seen in the open. I have never yet seen one of these birds in open country. Whether the Ground-Wren hops or runs I will not definitely say, because I have not satisfied myself on that point; but I believe that it hops. When it does rise from the ground it is only high enough to clear any bushes in the line of flight, and then the bird suddenly dives to earth again.

In addition to the note uttered while flitting among the scrub, these birds have a beautiful song—or rather, I presume, the male has. The song is very soft, but very sweet, with a considerable range of notes. One must be within a few feet of the singer to hear it, and, although it is difficult to get so close at the proper time, the trouble is well repaid. Recently I managed to get within three feet of a Ground-Wren by crawling to a clump of suckers. The bird stood pecking at the ground. It was early morning, and the bird, after preening its feathers, burst into a song. Suddenly it flitted back to the scrub, and at that moment down came a Honey-eater (*P. ornata*) again. The Ground-Wren brought its wings forward, spread its tail, and ruffled its feathers, until it looked like a ball, giving me a fine view of the red tail. The next instant the bird dived over a piece of scrub, and was lost to view.

**Purple-crowned Lorikeet** (*Glossopsitta porphyrocephala*, Dietr.)—

These birds visit us in flocks in large numbers on the approach of winter. They favour especially the salmon gum blossoms, though I have seen them pecking at the flowers of the mallee. Never have I noticed them on a white gum, although they may frequent it. They appear to be making their way gradually northwards. I have never found nests, neither have I ever seen the birds on the ground.

**Wood-Swallow** (*Artamus sordidus*, Latham).—This species is common in the district, and I do not believe that it is migratory at all. This winter I disturbed a very large flock from under the overhanging tops of a blackboy.

### Procellariiformes in Western Australia.

BY W. B. ALEXANDER, M.A., R.A.O.U. (PERTH, W.A.)

I HAVE recently had occasion to prepare a list of the Tube-nosed birds (*Procellariiformes*) found in Western Australia, and have come to the conclusion that a number of species which appear on various lists as inhabitants of or visitors to this State must have been placed there hypothetically, and not because of any actual specimen or definite record being forthcoming. As this is obviously an unscientific proceeding, I venture to bring the matter before Australian ornithologists generally, and should be very glad to learn of any authenticated specimens which may exist in museums or private collections in the Eastern States, which would enable me to add to the following list:—

**Pelagodroma marina dulciæ**, Mathews (*P. marina*, Latham).—Breeds on the Abrolhos Islands and perhaps on Breaksea Island.

**Puffinus assimilis tunneyi**, Mathews (*P. assimilis*, Gould).—Breeds on West Wallaby Island, Abrolhos, and Boxer Island, Recherche Archipelago.

**Thyelodroma pacifica chlororhyncha**, Lesson (*P. sphenurus*, Gould).—Breeds on Barrow Island, the Abrolhos Islands, Rottnest, and probably many other islands off the west coast.

**Hemipuffinus carneipes carneipes**, Gould (*P. carneipes*, Gould).—Breeds on the islands of the Recherche Archipelago and other islets off the south coast as far west as Cape Leeuwin.

**Pterodroma macroptera albanii**, Mathews (*Æstrelata macroptera*, Smith).—Breeds on Rabbit Island, near Albany.

**Æstrelata lessonii leucocephala**, Forster (*Æstrelata lessoni*, Garnot).—One specimen in the W.A. Museum, obtained at Cottesloe.

**Macronectes giganteus albus**, Potts (*Ossifraga gigantea*, Gmelin).—Numerous specimens in W.A. Museum; probably a regular winter visitor to the coast.

**Daption capense australe**, Mathews (*D. capensis*, Linné).—Recorded by Péron ("Voyage aux Terres Australes," vol. i., p. 212) as seen in Geographie Bay and "the whole length of Leeuwin-land" in 1801. Campbell ("Nests and Eggs of Australian Birds," p. 911) states that "on the western coast a few usually appear every winter," but does not mention his authority for the statement.

**Pachyptila vittata missa**, Mathews (*Prion vittatus*, Gmelin).—The sub-species is founded on a specimen obtained on the beach in South-West Australia.

**Heteroprion belcheri**, sub-sp. (?)—A specimen in the British Museum from South-West Australia, and two in the W.A. Museum from Cottesloe, probably represent a new sub-species of this Prion.

**Heteroprion desolatus mattingleyi**, Mathews.—A specimen in the British Museum, from South-West Australia, and four in the W.A. Museum (three from Cottesloe and one from North Beach), belong to this or some other sub-species of *H. desolatus*.

**Diomedea exulans chionopectera**, Salvin (*D. exulans*, Linné).—An Albatross obtained at Fremantle in 1887, with a label on its neck showing that it had come from the Crozets (see Campbell, "Nests and Eggs," p. 921, and, for a fuller account, Lady Broome, "Colonial Memories," p. 112), has been attributed to this species, but I do not know on what evidence.

**Nealbatrus chlororhynchus carteri**, Rothschild (*D. chlororhynchus*, Gmelin, and *D. carteri*, Rothschild).—Several specimens in W.A. Museum; a regular visitor to the coast in winter.

In the above list I consider that *Daption capense* and *Diomedea exulans* require confirmation. The following birds have also been included in one or more lists apparently with even less claim. The lists referred to are:—(1) "List of Birds Found in Western Australia," B. H. Woodward, Western Australian Year-Book, 1898-9, p. 187; (2) "Key to the Birds of Australia," R. Hall, 1906; (3) "Official Check-list of the Birds of Australia," R.A.O.U., 1912:—

**Oceanites oceanicus exasperatus**, Mathews (*O. oceanica*, Kuhl).—1, 2, 3.

**Garrodia nereis nereis**, Gould (*G. nereis*, Gould).—1, 2, 3.

**Fregetta tropica melanogaster**, Gould (*F. melanogaster*, Gould).—1, 2.

**Fregettornis grallarius**, Vieillot (*F. grallaria*, Vieillot).—1, 2, 3.

**Neonectris tenuirostris**, Temminck (*Puffinus brevicaudus*, Gould).—1, 2.

**Priofinus cinereus**, Gmelin.—2, 3.

**Priocella antarctica**, Stephens (*P. glacialoides*, Smith).—2, 3.

**Pterodroma melanopus**, Gmelin (*Estrelata solandri*, Gould).—1, 2.

**Cookilaria cookii leucoptera**, Gould (*E. leucoptera*, Gould).—1, 2.

**Halobæna cærulea**, Gmelin.—1, 2, 3.

**Thalassarche melanophrys impavida**, Mathews (*Diomedea melanophrys*, Temminck).—1, 2, 3.

**Diomedella cauta cauta**, Gould (*D. cauta*, Gould).—1, 2, 3.

**Thalassogeron chrysostoma culminatus**, Gould (*D. culminata*, Gould).—1, 2, 3.

**Phœbetria fusca campbelli**, Mathews (*P. fuliginosa*, Gmelin).—1, 2, 3.

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THE Council has obtained vols. ii. to ix. of *The Emu*, and members desiring to complete sets should write to the hon. secretary of the Union, stating their requirements, not later than 31st January, 1916. Applications for purchase of the volumes available will be dealt with by the Council in due course.

## Notes upon the Ground Cuckoo-Shrike (*Pteropodocys phasianella*).

BY C. F. COLE, R.A.O.U., WANGARATTA.

BEING conversant with this bird only as a cabinet specimen, it was my good fortune to come across it in the flesh about sundown on 5th June, 1914, at Londrigan, some 6 miles from Wangaratta, in the north-east of Victoria. Whilst harnessing a pony to the gig, my attention was attracted by hearing a strange muffled sound like *Woof, woof*, which seemed to arise from the ground close to the butt of a eucalypt sapling some 45 feet high standing close to the gig. I listened intently and searched the ground, to find the cause of this now oft-repeated muffled *Woof, woof*, unfamiliar to me in the bush, but failed to find anything about or above ground close to the sapling butt to account for these strange sounds. Standing close to the bole of the sapling, I began to search the leafy boughs above in the hope of elucidating the mystery. My suspicion being aroused that the sounds might be ventriloquial in nature, and daylight fast disappearing, my son and self made a close scrutiny of the tree-top, with the result that we saw, perched right at the top of the sapling, upon a small horizontal bough, three greyish-coloured birds, touching one another and facing all one way, a habit characteristic of birds of the *Artamus* and *Sittella* genera. When I threw up a stick they took flight, and uttered sharp and rather sweet notes whilst upon the wing. The first portion of their flight was somewhat quick and rollicking, broken every now and again with a little volplaning. While volplaning the wings were kept in a downward position, somewhat like the letter V reversed, only extended thus— $\wedge$ . This part of their flight resembled that of the Ground-Parrot (*Pezoporus terrestris*) or Stubble-Quail (*Coturnix pectoralis*) when about to alight. The volplaning, besides giving a peculiar effect to their flight, was most interesting to watch. On throwing another stick, similar notes and flights were repeated. The birds returned and took up their previous attitude upon the same branch in the same spot. A third time they were put to flight, with the same result. Finding that the birds intended camping for the night upon this particular branch, I returned at midnight, and, having a suitable moon for "mooning them," secured two of the birds for scientific purposes. Upon handling them I found that they were the Ground Cuckoo-Shrike (*Pteropodocys phasianella*), male and female—rare visitors, and splendid specimens of their kind. As in other species belonging to this family, the feathers readily leave the body.

Some weeks later I heard the same sound, *Woof, woof*, at Stanley, a mountainous district of Victoria, some 2,500 feet above sea-level, and located a pair of birds perched high up in a tall eucalypt tree. Upon 17th August of this year (1915) I met the bird much further south, close to Euroa, on the Mansfield road. Two of

them were perched close together in the top of a low sapling, my attention being again attracted by the sound *Woof, woof*, whilst I was cycling along. The bird, when found sitting as described, does not take fright easily, and, although the pair of birds seen at Euroa was flushed from the trees several times, no attempt was made to return to the tree flushed from, to settle upon the ground, or to volplane as they did after the first time of taking flight.

Undoubtedly, the peculiar and circular flights of *P. phasianella* at dusk on the evening of 5th June, 1914, were controlled by an impulse to return each time to the tree and branch they had selected as a roosting-place for the night. Possibly it is a characteristic of this bird to return, if disturbed after having settled down for the night, to the tree selected for roosting in.

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### Morning Song of the Noisy Miner (*Myzantha garrula*).

By ROBERT HALL, C.M.B.O.U., C.M.Z.S., R.A.O.U., HOBART.

THAT very common bird, the Noisy Miner, is without credit for its morning song—a psalm of dawn. Rather, we incline to ridicule it for the poverty of music in its notes. They are mostly calls or alarms. That is true with regard to its life between sunrise and sunset. To my great surprise, an agreeable phase of this bird's life-history has shown itself. Before sunrise, and as the day breaks, a solitary bird, judging by the general quiet, will pour forth for twenty minutes a most agreeable song in its nesting area. It is a song of short phrases, and not as continuous as that of the Skylark (*Alauda*) in the day-time or of the Bush-Lark (*Mirafra*) in the moonlight, or by the Reed-Warbler (*Acrocephalus*) within its bed of reeds. The song of the Black-and-White Fantail (*Rhipidura motacilloides*), made up of five notes, is very simple when compared, and is practically at the opposite pole to that of *Alauda* or *Mirafra*. So even and so sweet is the calm of the song that it certainly is not one of rivalry. There is no flight in song as with *Mirafra*, and it is too much in the dark for display of plumage. The phrases have intervals of a few seconds, and they are very simple. The two liquid notes rendered as *Ko-tek* remind me of the contralto notes of the Magpie-Lark (*Grallina picata*).

The rendering given of this song of dawn is to be taken as correct with latitude. The bird itself on different mornings will make its variations, both in pitch and in the order of the phrases, and our musical notation does not yet seem possible for bird song.

On 1st October, just when the first of the daylight came along, and when birds and animals in general were asleep, in a perfectly calm air a voice broke the stillness, clearly and crisply, with *Ko-tek, ko-tek, ko-tek*. With an interval of three seconds

the following highly-pitched notes most surely broke into the morning:—We-we, we-we, we-we, we-we. With a brief rest of another three seconds the singer of these high and sweet notes from the same position sent forth four liquid notes—Pick-up, pick-up.

At this time our Tasmanian Magpie, *Gymnorhina organicum*, finding himself to be awake, contributed his series of organ-like notes. I think the carol of the Magpie is eclipsed by the song of the Miner, generally referred to as the plainest of plain birds—the “common Delft” of the feathered world. By the finding of this song in our district, I feel as if I had unearthed a thing of rare beauty, open to the public between the hours of 5 and 5.20 a.m. in the spring of the year.

As more light came in so less song came out. What impressed me was the absence of nearly all the day notes—the common notes—the whole being a long series of different bars rendered in fairly regular order to get effect.

It was on the following morning that I hoped to be awake to get a record of this really happy outburst. I was fortunate in the following result:—

2nd Oct., 1915, 5.4 a.m.; morning calm and fine; locality, Bellerive, Hobart; the position as yesterday, and doubtless the same male bird nesting in the garden near the window of my dressing-room sang (see plate). Now followed a long interval and silence, except for the Tasmanian Magpie's voice, which is rather like the tuning of a 'cello: inferior to that of the Victorian species, and superior to that of the Western Australian form.

The silence of the Miner continued to 5.50 a.m., when it gave the first of its daylight calls—the well-known and unmelodious thin and reedy querulous notes. A second long silence followed up to 7.5 a.m., when the interval was terminated by another series of day-time notes—Peep-peep, peep-peep. The morning song had lasted just twenty minutes.

3rd Oct., 5.3 a.m., was the opening time of the second observation. The complete time of the song was eighteen minutes. The first phase started with a low, indefinite note to lead the We-we on its way—approximately Tche-we-we. The We-wes are subject to regular variation of pitch, though every note of the phrase is the same as the first. It is this variation that helps the agreeable effect. Near the conclusion the Tek of Ko-tek had a lengthened accent upon it, and the notes of the Ko-tek had the same pitch. Between 5.13 and 5.18 a.m. the intervals became wider. Between 5.18 and 5.21 there was no interval. The five notes immediately following were very faint. These were the last of what I certainly feel was its most definite and interesting psalm of dawn. The phrases throughout the first two-thirds had fairly regular intervals.

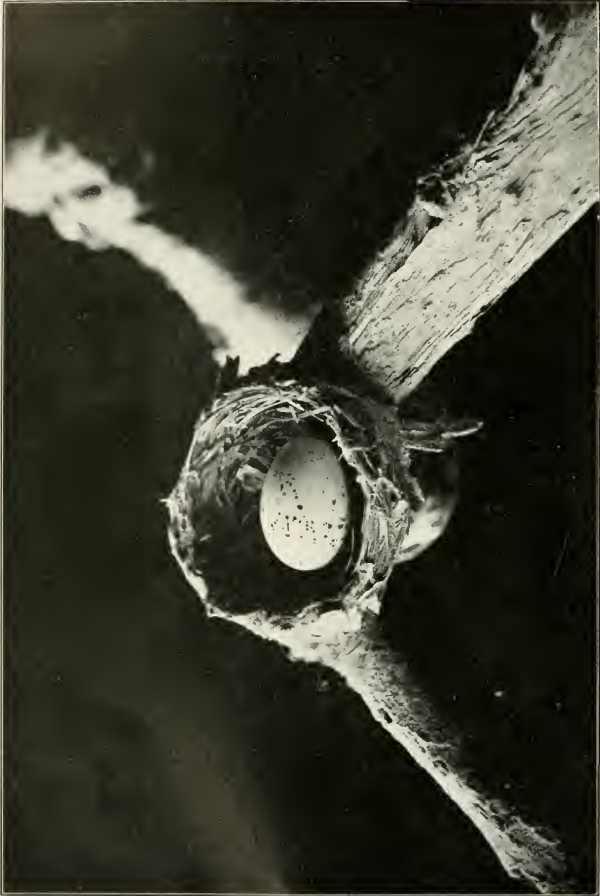
The sounds in order from first to last were:—Tche-we-we; ko-tek, ko-tek, ko-tek, ko-tek (with slight variation); phed-e-rate;

We-we-we... We-we-we... phed-e-rate... we-we-we... We-we-we... Kotek...  
 We-we-we pick-up. We-we-we. phed-e-rate. We... phed-e-rate.  
 pick-up. We... Kotek. We... Kotek.  
 We... We... We... phed... Kotek... We...  
 Kotek We... phed... We... We... Kotek...  
 We. We. Now becoming fainter and longer intervals.  
 30 sec. phed... We... Kotek... We... We.  
 Ye. Ye... phed... Ye... Ye... Kotek... Ye...  
 phed... We... Kotek... We...  
 45 secs. 77777 777 20 secs. 7777777  
 We. faint Ye...  
 finis.  
 twitter and faint.  
 Kotek Weve Pick-up.

Noisy Miner's Morning Song.







Nest and Egg of Yellow-breasted Flycatcher.

FROM A PHOTO, BY A. J. CAMPBELL.

ko-tek (four notes), we-we (four times repeated); we-we (four times); we-we (four times, pitch altered); phed-e-rate (twice); we-we (four times); ko-tek (twice); we-we (four times), phed-e-rate (twice); we-we (twice); we-we (four times), ko-tek (four times); we-we (three times); we-we (four times, at much higher pitch); ko-tek (four times); we-we (four times); we-we (four times), and ko-tek (once) and we-we (four times), all quickly followed; interval of several seconds; we-we (eight times); ko-tek (once); we-we (four times, pitched high); we-we (four, medium pitch); interval of several seconds; ko-tek; phed-e-rate (four times); pick-up (same value); we-we (three times); intervals were becoming wider, with last few notes faint, 5.21 a.m.

Nothing further was heard till 7.5 a.m., when the first of the day calls was given—a series of six sharp, twittering notes.

The *Grallina*-like notes were particularly interesting because if by imitation they must be by inheritance, as we have no *Grallina* in or near this district. The nearest *Myzantha garrula* was approximately 400 yards away, and on one occasion only did I hear that or any other of its species giving notes of its song. In other words, the male bird was the only singer in the area allotted to a pair of birds at this season of the year.

Mr. Giblin, M.H.A., tells me that Miners sing in chorus; that in the stillness of early morning one bird will strike its first clear, sweet, and strong call, when promptly follow a number of its companions, as if to vie with each other in the pure joy of living another day. Without knowing the fact, I should incline to believe this chorus to be a song of the early part of spring, before the birds have paired and become isolated for nesting.

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## Camera Craft Notes.

**Two Northern Nests.**—The nest of the Lemon-breasted Flycatcher (*Microeca flavigaster*) is one of the smallest of those of Australian birds. The structure is about the circumference of a half-crown, and is the receptacle of a single egg. The pretty bird is fairly plentiful in the tropics of Queensland, where it seems to take the place of our familiar friend the Brown Flycatcher (*M. fascians*) of the south. The nest of the White-breasted Honey-eater (*Glyciphila fasciata*) was taken from a paper-barked tea-tree, or *Melaleuca*, near where some "tea-tree" orchids were growing. The nest was suspended over a lily lagoon, and was constructed of shreds and strips of tea-tree bark, and is dome-shaped. The Brown-backed Honey-eater (*G. modesta*) is the only other Honey-eater known to build a covered nest; those of all the rest of the family are open.

I am indebted to the Messrs. Harvey Bros., Mackay, for the two interesting nests which I have illustrated.—A. J. CAMPBELL. Armadale, 15/11/15.

**Spotless Crake.**—A nest of the Spotless Crake (*Porzana immaculata*) was found by me in the school swamp on the 28th November, 1914. It was built among rushes and reeds over five feet in height, and was placed three feet above the muddy water. The eggs were fresh, and, knowing from previous observations that the period of incubation is 16 to 18 days, I did not look at the nest again until the 15th December, when the three eggs were slightly chipped. Early next morning I again visited the nest, and one chick was out. It immediately dived over the nest into the slush beneath, and a long time elapsed before I found it. I then brought my camera to the nest.



Spotless Crake's Nest, with Chick and Eggs.

FROM A PHOTO. BY MISS J. A. FLETCHER.

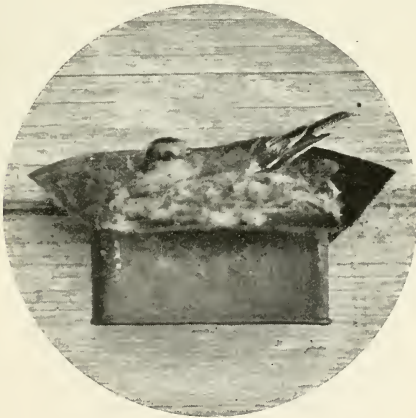
As the little Crake would not sit still, I made it a prisoner in my camera case for the nonce. Focussing was exceedingly difficult, owing chiefly to the unstable conditions of the boggy ground. When all was ready I placed the chick in the nest. It lay still for an instant, and I exposed a plate. Young Crakes and Rails are difficult subjects for the photographer, as they hide immediately the rushes are parted. A nestful of Crakes is a pretty sight. The down of the little birds is a beautiful, shining, greenish-black. I found a nest at 5 a.m. this morning, but I had barely time to count three fledgelings before the nest was empty.—(Miss) J. A. FLETCHER. Springfield (Tas.), 20th November, 1915.



White-breasted Honey-eater's Nest.



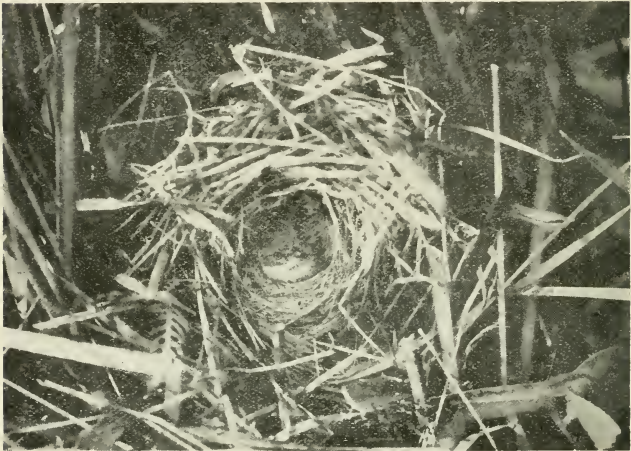
**Robin's Nest in Tobacco Tin.**—About the middle of October, 1915, one of my sister's scholars reported that a pair of Flame-breasted Robins (*Petroica phoenicea*) had a nest in a tobacco tin, which had been fixed to a wall for use as a soap dish. The house had been empty for a while. The tin chosen by the birds as a nesting site was nailed under the verandah of the kitchen. The situation was hardly a good one, on account of the strong draught blowing through. The lighting also made it very difficult to obtain a good photograph. I exposed a plate, and, though the camera was close to her, the brooding bird remained on the nest. I afterwards flushed her to count the eggs; there were three. This was on the 20th October. On the 7th November I went to see if the young birds were still in the nest, and found them fully fledged. The day was windy, otherwise, I think, the fledgelings would have been gone. After a great deal of trouble, I obtained a photograph of the young birds, but, owing to the wind, they would not turn round. They were huddled together. I tried to persuade them to face me, but one became so indignant that it fluttered to the ground. I picked it up, and managed to secure a picture of it sitting on top of the nest, and also of the others in the nest.—(Miss) J. A. FLETCHER. Springfield (Tas.), 27/10/15.



Female Flame-breasted Robin on Nest in Tobacco Tin.

FROM A PHOTO, BY 'MISS' J. A. FLETCHER.

**The White-browed Scrub-Wren.**—One of the most interesting of small birds is the White-browed Scrub-Wren (*Sericornis frontalis*). Though building in shadowy, secluded spots—usually among dense brushwood or in a pile of *débris*—the Scrub-Wrens are so jealous of privacy that they betray their nests by noisy protest if one approaches the vicinity. I have found scores of nests, and only once flushed a bird. In all other instances spluttering volleys of chiding notes were the prelude to discovery. Anger and rebuke are clearly expressed in the Scrub-Wren's vocal outburst when it is disturbed during the breeding season. At



Female White-browed Scrub-Wren in Nest.

FROM A PHOTO. BY CHARLES BARRETT.

other times, without being chided, I have quietly observed these active little birds prospecting the ground for food. Their notes of peace are rather soft and pleasing; and the birds themselves are so "amusive" and graceful in their actions that one does not soon tire of watching them.

In the coastal tea-tree (*Leptospermum laevigatum*) Scrub-Wrens' nests are placed among fallen branches or in forks, from 3 to 12 feet from the ground; as a rule the site is low—in fact, a nest may be only a foot above the earth. Like many other birds, *Sericornis frontalis* adapts itself to altered conditions. When the scrub is "cleaned up" to suit picnickers, and heaps of *débris*

disappear, the birds take to the trees. On the moorland which lies at the back of the coastal scrub along some parts of Port Phillip Bay, nests are occasionally found in clumps of heath (*Epacris*) or grass tussocks. My earliest record for seaside nests is the first week in July; usually the nesting season ended in October, with August as the principal month. The Scrub-Wrens are greatly victimized by Fan-tailed Cuckoos (*Cacomantis flabelliformis*). During one season, in the Black Rock district, many of the nests examined contained either an egg of the Cuckoo with two of the Scrub-Wren, or a Cuckoo fledgling in solitary possession. In the majority of cases the Cuckoo's egg closely resembled those of the foster-parents, both in size and coloration.

This season (1915) I was able to secure a series of photographs of the White-browed Scrub-Wren. A nest was found at Evelyn, Vic., the site being a clump of sword-grass in an "island" of tea-tree and acacias, close to the roadway. The lighting was fairly good when a few protruding boughs had been temporarily pulled aside, and after an hour's indecision the birds became confident. Mostly they approached the nest from the rear, creeping up the sharp-edged grass-stems like field mice. The nest contained three chicks, a few days old, and food was brought to them at short intervals for half an hour; then the parent birds disappeared, and nothing was seen or heard of them for a long time. When they did return it was so quietly that one was perched on the top of the nest before its presence became known to me.



Spine-bill Honey-eater.

Several times in the course of the afternoon these long periods of absence occurred. Finally the female bird entered the nest and remained there. But she kept a bright look-out, as the position of the head and expression of the eye in the photograph indicate. It is not often that one has an opportunity of photographing a Scrub-Wren in its nest.—CHARLES BARRETT. Melbourne, 12/11/15.

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## Stray Feathers.

**Birds Under Shell Fire.**—The following is an extract from a letter written by a machine-gun man of the 21st Battalion:—“A rather curious incident took place a few days ago, which might well be termed, ‘in the midst of war we are in peace.’ Just at the first streak of daylight a rather lively artillery demonstration started. Three battleships and fourteen of our field-guns were shelling a Turkish position about 70 yards in front of our particular bit of breastwork. I happened to be observing at the time, and whilst I was crouching down on the parapet, trying to look as much like a sandbag as possible, two Sparrows flew along and perched on my wrist. They preened their feathers and chirped to each other for fully a minute before flying away. This was whilst high explosive shells were screaming overhead at only few second intervals and bursting less than a hundred yards away.”

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**Hawks in Egypt.**—Following is an extract from a letter written by Mr. Arthur Swindells, R.A.O.U., now on service at the Dardanelles:—“Yesterday three of us hired a gharry and drove round the old mosques and tombs. From the top of one mosque, with a most unpronounceable name, we had a grand view of Cairo. I counted 173 steps as I ascended, and then gave up, as the view claimed my attention. . . . What interested me more than anything about the great mass of masonry, now fallen into disuse, and over 1,020 years old, was the number of niches in the high walls, from which flew Hawks in dozens. The nests could plainly be seen, and I was sorely tempted to essay a climb, but, alas! when I suggested the idea to the guide he immediately became horrified and gesticulated wildly, calling on Mahomed and Allah to vent his wrath on the heathen who would dare profane the sacred walls. As he seemed to take the matter so badly, I thought it well to stifle my desires, but my fingers just itched to get at those nests. However, when on the parapets I did manage to elude his vigilant eye for a moment and skip along to a place where I could lean over and see a nest with downy young. The guide afterwards showed us bowls of water placed in various parts for use of the birds. Evidently they regard these Hawks with a special veneration. The Hawk is about the size of our Brown Hawk, and not unlike the Harrier. They are here in hundreds,

and around the camp one can count them in dozens. They have no fear of the city, and circle over the buildings and alight on the roofs unconcernedly. Another kind of bird is a Crow marked like our Magpie. Swallows are everywhere."

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**Early Voices.**—Being desirous of hearing what was astir in the early hours of morning now that spring has fully come, I turned out yesterday at 3.30 a.m., and at 4 o'clock heard from my verandah the loud, cheerful, whistling calls of the Crescent Honey-eater (*Lichmera australasiana*, Shaw). While residing in the bush some miles from Table Cape, North-West Tasmania, I always noticed that this species was about the earliest to be astir, although it was run very closely by our Dusky Robin (*Anaurodryas vittata*, Q. and G.) The latter does not occur just in my immediate neighbourhood here, although it is found in the district, so that yesterday the Crescent "held the floor" at dawn, and from 4 until 4.40 was the only voice heard. At this period a Magpie (*Gymnorhinus organicum*, Gld.) came into a white gum just at the back of the house and commenced warbling his love-ditty, which he continued almost without cessation until 5.20. He is a young bird of last season, as I know by his voice, and gives this performance each morning at about the same hour, lasting from thirty to forty minutes. At 5.20 a.m. the loud, penetrating calls of the Pallid Cuckoo (*Cuculus pallidus*, Lath.) were borne upon my ears, and continued, with the usual persistence of this species, for several hours. It is strange that this was the only Cuckoo heard; the Fan-tailed, usually very plentiful in this locality, is quite scarce so far this season, nor does the Bronze appear to be up to its usual numbers, although I have seen several individuals. Nothing fresh was noted, beyond the chirping of the ubiquitous Sparrow, until 6.50, when the Butcher-Bird (*Cracticus cinereus*, Gld.) made his presence known by a ringing laugh proceeding from a group of saplings; long before this it was, of course, broad daylight.

Of evening voices, the Pallid Cuckoo appears to be the latest. More than once this spring he has been calling not far from the house until 7.45 p.m., when it was practically dark. In the Table Cape bush I have heard the Fan-tailed Cuckoo (*Cacomantis flabelliformis*, Lath.) uttering its soft trill at intervals for several hours after dark, but the Pallid usually ceased when daylight failed.—H. STUART DOVE, F.Z.S., R.A.O.U. West Devonport (Tas.), 23/10/15.

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**Notes from Springfield (Tas.)**—This season is remarkable for the numbers of Robins—Scarlet-breasted (*Petroica leggii*) and Flame-breasted (*P. phoenicea*)—that are spending the nesting time here. The excessive rain seems to have deferred the nesting season, and many birds are only now attending to the first brood. Another

noticeable fact is the great number of clutches of eggs that are being destroyed. I think that the unusual amount of rain has flooded out the snakes earlier than usual, and the birds, being later in nesting, are suffering. Our swamps also are a great resort of golden-bellied water-rats, and their footprints may often be traced near nests, in which the animals occasionally curl up to sleep, no doubt after supping off the contents.

Most of the Lewin Rails (*Hypotaenidia brachypus*) appear to have taken a season's freedom from family cares, or else they have migrated, for their nests are seldom found. In fact, this season I have discovered only two, each containing four eggs, and two with egg-shells. The nests with unhatched eggs I watched in the hope of obtaining photographs of young birds, but they appeared on wet days.

The Spotless Crakes (*Porzana immaculata*) have also been very dilatory, though most of the clutches have been exceptionally large, doubtless the favourable season for these birds ensuring an abundant food supply. In the two seasons during which I have been studying these birds the average clutch has been three eggs, occasionally four. Last year, on account of the drought, I found several birds sitting on two eggs. Early in November, 1915, I found one of the "two-set" Crakes sitting on a clutch of six eggs, and still later another clutch of six came under my notice. In this latter, strange to say, one of the eggs was twice the size of the others, being probably double-yolked. This spring I have also found several nests of this Crake containing five eggs, on which the bird was sitting. These observations show that a hard and fast rule cannot be laid down with regard to the number of eggs to a clutch in the case of these birds, which are dependent on the rain-fed swamps.

It is worth recording that twice I have seen a four-clutch of Emu-Wren (*Stipiturus malachurus*) eggs—namely, on the 8th November, 1913, and on 7th December, 1914. The two clutches did not belong to the same pair of birds.—(MISS) J. A. FLETCHER. Springfield (Tas.), 20/11/15.

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**Cormorants in Tasmania.**—Tasmania, with its many fresh-water lakes, marshy lagoons, and quiet streams, its broad estuaries and secluded bays, teeming with food supplies, offers special attractions to the family of Phalacrocoracidae. Yet, notwithstanding these advantages, the birds, with the exception of *P. carbo* and *P. leucogaster*, are by no means so numerous as is generally believed.

In the quiet lagoons and inland streams, lonely, secluded, and far from the usual haunts of man, one occasionally comes across a company of four or five Little Black Cormorants (*P. sulcirostris*) quietly engaged in procuring a meal; and on the lakes, in company with *P. carbo*, the birds may also be found, but never in very great numbers. Rarely indeed are the birds seen near the sea-coast—

the big bays and wide, open arms of the sea possess no charm for them; they prefer backwaters of rivers, hidden nooks of lakes, and the lonely, silent lagoons. The species is unusually shy and somewhat difficult to approach. The slightest indication of human presence alarms and causes them to leave quickly for less-frequented waters. So far as I am aware, the nests and eggs of *P. sulcirostris* have never been found in Tasmania; but, in all probability, their breeding places are the swamps and marshes in the Lake district, or on river reaches far inland.

The Little Black-and-White Cormorant (*P. melanoleucus*) is very thinly distributed over the island, and is not often seen. Although occasionally noticed on inland waters, its favourite haunts are tidal rivers, sheltered bays, and the shallow lagoons of the sea. In such situations the birds may be observed diligently searching for food, which consists of fish, crustacea, and other small forms of animal life. The habits of this species differ from those of others of its genus, inasmuch as, during the day, it leads a somewhat solitary existence, preferring to hunt alone, after which it may often retire to some favourite perch on a post or dead branch, where, motionless, it sits digesting its meal. In the evening it returns to the society of its fellows, roosting with them in the low trees fringing the shore. In the various armlets of Recherche Bay I have frequently seen these birds, and also in the big salt-water lagoons at Southport, where, I believe, they breed in company with *P. carbo* on the tea-tree bushes and small trees on one of the islands.

The Black Cormorant, or Shag (*P. carbo*), is perhaps more widely distributed than any of the other species, for not only does it inhabit the islands adjacent to the coasts, estuaries, and inlets, but also frequents many of our rivers and lakes, where it is found throughout the year, and is supposed to breed. Few instances are known of its nest and eggs being found in Tasmania, although it is recorded that on some of the islands of Bass Strait small colonies have their rookeries. Eggs have been taken at the head of the Derwent River, and on the low-lying, scrub-belted islands in the lagoons near Recherche Bay nests and eggs have been observed. I am confident that the nesting haunts of these birds will be found at the lakes far inland, where birds in immature plumage have frequently been seen.—A. W. SWINDELLS. Hobart (Tas.)

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**Birds Destroyed by Storms.**—Two walks which I took along the beach north of Fremantle on 7th and 8th August, 1915, indicated that the stormy weather which had prevailed fairly continuously for several weeks past had resulted in the destruction of a number of birds. I found the remains of a Pied Cormorant (*Phalacrocorax varius*, Gmel.), a Yellow-nosed Albatross (*Diomedea chlororhyncha*, Gmel.), and three Prions of two different species. On 14th August, after more stormy weather, during which all

the remains of the previous week had been buried under the sand, I found another Prion of the same species as that found in the previous week, another Yellow-nosed Albatross, a White-headed Petrel (*Estrelata lessoni*, Garnot), and an Indian-runner Duck! The latter may perhaps have been blown into the sea at Rottneest Island, or else washed overboard from a ship.

In addition to these finds on the beach, a Giant Petrel (*Macronectes giganteus*, Gmel.) was picked up at Fremantle in an exhausted condition at the beginning of July, and died soon after it was found. It was presented to the Museum by members of the Fremantle Fire Brigade. A Reef-Heron (*Demiigretta sacra*, Gmel.) was also blown inland, and was presented to the Perth Zoo, where the director, Mr. E. A. Le Souëf, showed it to me.

This is doubtless only a fraction of the havoc wrought by the stormy weather in the immediate neighbourhood of Fremantle—say five miles of the coast-line. Multiply it to take into account the 1,000 miles of the coast-line of the State over which such storms are felt, and we shall have a faint idea of the terrible destruction of sea-bird life produced by a strong blow.

Brief notes on the birds mentioned are appended:—

*Pied Cormorant* (*Hypoleucus varius perthi*, Mathews).—This is the common "Shag" of the Swan River. There seems to be some doubt as to how much further south its range extends, the species found in the Recherche Archipelago, off the south coast, being the White-breasted Cormorant (*Hypoleucus fuscescens*). It would be interesting to know whether the ranges of the two species overlap, and, if so, where. The birds on the Swan River are all immature, or, perhaps more correctly, in non-breeding plumage; presumably at the breeding season they go out to sea to nest on the various islands off the coast, and at their breeding-grounds they are found in the bright nuptial plumage. A sufficient number remains on the river throughout the year to prevent the absentees being noticed, which would point to their not breeding in the first season.

*Yellow-nosed Albatross* (*Diomedea chlororhynchus*, Gmel.)—The two specimens noted above are of interest as showing that the species is not uncommon on the west coast in the winter months, and supplement the remarks I made in a previous article (*Emu*, vol. xv., p. 25).

*White-headed Petrel* (*Estrelata lessonii leucocephala*, Forster).—I cannot ascertain whether this bird has been obtained in Western Australia before. All the works I have consulted follow the British Museum Catalogue, and give "Australian Seas and Southern Indian Ocean," with the exception of Hall's "Key," which gives this State in the distribution. The reference to Southern Indian Ocean might have been the reason for this, but the specimen referred to in the British Museum Catalogue was captured in S. lat.  $40\frac{3}{4}^{\circ}$ , E. long.  $125\frac{1}{2}^{\circ}$ —nearly 500 miles south of the Western Australian coast-line.

*Giant Petrel* (*Macronectes giganteus*, Gmel.)—Mr. G. M.

Mathews \* quotes an extract recording the capture of a bird of this species at Fremantle. The writer states :—" Two islands here are the home of the Giant Petrel." It certainly seems probable that the species nests somewhere off the coast, as it is frequently met with. We have in the Museum specimens from Busselton, Bunbury, Fremantle, Cottesloe, and the Abrolhos Islands.

*Species of Prion.*—When writing my note on *Heteroprion desolatus* I had not noticed that under *Prion vittatus missus* Mr. Mathews states that there are two other Prions shot in Western Australian waters in the British Museum, " one of which seems to be an immature specimen referable to *H. desolatus*, but not agreeing exactly with *H. d. mattingleyi*, while the other is near *H. belcheri*, but again not exactly matching the type of that species." The four Prions referred to above are almost certainly referable to two species, there being two specimens of each. Of these, the broader-billed form is referable to *H. desolatus*, and the other appears to be near *H. belcheri*, but the bill is not quite so narrow (10 mm. broad against 8 mm. in *belcheri*).

It is obvious, as Mr. Mathews has frequently insisted in his book, that the Petrels found on the Western Australian coast would well repay study, and it seems quite probable that nesting colonies of some of them await discovery.—W. B. ALEXANDER, Keeper of Biology, Perth Museum. 17/8/15.

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### From Magazines, &c.

**Cuckoos in New Zealand.**—" The Shining Cuckoo, apparently, is plentiful in many parts of the Dominion now " (writes Mr. J. Drummond, F.Z.S., in the *Lyttelton Times* of 30th October, 1915). " Mr. W. W. Smith, curator of Pukekura Park, New Plymouth, writing on 26th September, reports that the first specimen noted this season sang in the park at 1 p.m. on 24th September. ' I have been waiting for this bird's arrival this season,' Mr. Smith states, ' in order to ascertain if the remarkably early and warm spring we have experienced here would bring it earlier than usual. As you will see by reference to your records, it is three weeks to the day earlier than in any other season during the past seven years. Nests of several native and naturalized birds have been obtained in the park for nearly a month. Many species of native plants are flowering about two weeks earlier than they have flowered in any previous year since I came here, seven years and a half ago.' "

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**Magpies in England**—In the May, 1915, issue of the *Avicultural Magazine* Mr. B. Theo. Stewart writes interestingly on " The Australian Piping Crow," which, he says, figures so largely in prose

\* " Birds of Australia," vol. ii., p. 188.

and verse that everyone should be familiar with it. Following are some extracts from the article:—

“Owing to the fact that the importation of this bird is now strictly prohibited, a heavy fine being the penalty, the price of Piping Crows has risen by leaps and bounds—anything up to £10 being asked by dealers: in fact, they are hardly to be procured at any price. Times change, truly; my first Crow cost me just under a sovereign. Writers speak of the ‘joyous whistle of the Piping Crow,’ but there is little of a joyous nature about the Never-Never bird. His notes—that is, the wild caught bird—are powerful and mellow, but, to my thinking, melancholy. As a mimic he is great, but his talking powers are somewhat over-rated; many words are very clearly enunciated, but the vocabulary is strictly limited, and never, never will he learn to whistle the last notes of a tune. The female of this species is not so accomplished as the male, though equally interesting and docile. She is smaller, the white and black of the plumage is less glossy than that of the male bird, and her beak is feebler. One female that I possessed was highly intelligent; you had only to show her a mouse trap and she would tell you what ought to be in it. An empty cotton reel made her very happy, and she would lie on her back holding the reel in her claws and play for hours like a kitten. . . . I have, at the present time, a remarkably fine Crow, just over four years of age, who is known in the family circle as ‘Poor Peter.’ He came to me as a nestling, in the dingy grey and muddy black dress worn by the infant Magpie. He was so extremely youthful that he could not eat correctly; as to water, apparently he had never heard or seen it, for he swallowed it in drops out of a teaspoon in fear and wonder. Even now he is strangely abstemious, and uses water for bathing only (really its proper purpose)! Perches he had no use for, preferring to roost on the cage bottom—a fad he still indulges in. Peter belongs to the white-necked, black-backed variety, and is beautifully marked, the black being very black and the white very snowy. His beak, which was black at first, soon changed, and is now quite a fine instrument, long and polished, greyish-blue, with a black tip. Peter always answers to his name, and will run from any part of the house or grounds, on being called, as obedient as a dog. He is also a highly-trained bird. For instance, he can fetch and carry a ball or piece of paper, deliver it up and wait for you to throw it. Will ‘shake hands’ at command, sit on one’s lap and allow his feathers to be stroked, &c. He has a really charming temperament, a trifle hasty sometimes; but, as the cook said, a little present will quickly bring him round.”

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**Habits of Cuckoos.**—In an article in the July, 1915, issue of the *Avicultural Magazine*, Mr. Hubert D. Astley deals with the habits of the Cuckoo (*Cuculus canorus*) in the breeding season. He was awakened one morning by the notes of a Cuckoo, and

hurried out of bed, and found the bird perched on the top of a pergola:—

“ At that moment my eye was attracted to a fluttering and struggling of wings just where some honeysuckle has grown up one of the oak uprights, and almost underneath where the Cuckoo was perched. Seizing my field-glasses, I was greatly thrilled to find it was a female Cuckoo, which was hanging on to the squared side of the timber, partly supporting herself by the growth of honeysuckle, and inserting her head into a smallish aperture in the wood, probably one cut out originally for the end of a transverse beam, when these old timbers formed part of the roof of a barn. She remained like that for at least six or eight minutes, constantly popping her head into and out of the hole. Once a male Chaffinch swooped at her, backwards and forwards, uttering a ‘pink-pink’ of alarm or indignation, and the Cuckoo, still hanging on to the upright beam and still fluttering her wings, turned up her head at the Chaffinch and opened her mouth so that I could plainly see her orange gape. Then she returned to her business, popping her head into the hole again, as if she was either eating or arranging something. At last she flew off with clucking notes, and was immediately followed by the male. I heard his passionate ‘Cuck-cuckoo, cuck-cuckoo’ dying away as he disappeared round the corner of the house. Then I hurriedly dressed, took a light ladder, propped it up against the pergola, and peered in. A Pied Wagtail’s nest with two eggs, and a Cuckoo’s! all most neatly arranged. She must, after depositing the egg from her mouth in the nest, have been busily arranging things so that all should look well on the Wagtail’s return. Of the latter I saw nothing. It was curious that a Chaffinch should have taken up the cudgels. It was an uncommon scene, which more than repaid one for being awoken at 5.30 a.m. . . .

“ What doubles the interest of this episode of a May morning is that the male Cuckoo was quite evidently excited about it, although such a thing has before now been observed. Whether the female Cuckoo had just arrived with her mate, I don’t know. I am inclined to think so, for even as I saw her she was a long time at the nest, which, I may add, is 8 feet from the ground. And then people talk of the instinct of the lower creatures as something that compels them to act, without possessing reasoning power! In the first place, the Cuckoo would have to watch the Water-Wagtails, for I cannot suppose she would search in places where she would have to cling on with evident difficulty in obtaining a foothold, unless she was sure there was a proper receptacle for her egg. And on seeing the Wagtails building she would continue to watch. No human knew of the nest, although I for one constantly walked past it, and constantly saw the Wagtails in its near vicinity. Indeed, I had gone so far as to wonder where they were building, for last year they reared three broods in a hole in an old stone wall, and this year the hole was vacant. Moreover, the Cuckoo waits until one or two eggs are

laid by the foster-parents of its future offspring. Again, the bird must deliberately keep an eye on all that they are doing, for don't tell me that Cuckoos invariably come across nests by chance, in which the full complement of eggs is not yet laid; and do Cuckoos ever make mistakes, putting an egg in a nest where the other eggs may be ready to hatch? I don't think so. My pair of Cuckoos arrived together, as far as I could make out, just as they departed together, and must have known beforehand of the Wagtail's nest, and that the moment had come for the egg to be deposited."

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**Sparrow-Hawk versus Weasel.**—Many interesting bird notes are published in the column entitled "In Touch with Nature," conducted by Mr. J. Drummond, F.L.S., F.Z.S., in the *Lyttelton Times*, New Zealand. The following appeared in the issue of 30th October, 1915:—

"A desperate encounter between a Sparrow-Hawk and a weasel is described by Mr. J. A. Brooking, of Wanganui. He was supplied with the information by a friend, who actually saw the incident. Mr. Brooking's friend was riding quietly, and was surprised by a dark brown object shooting past him and, apparently, striking the ground behind a bunch of toe-toe a few yards away. A squeal was heard immediately afterwards. Investigations showed that a fight between a Sparrow-Hawk and a large weasel was in full swing. The bird was sitting on the ground, with its tail feathers spread out fan-like behind it, and it was grasping the weasel with both claws. The right claw was on the weasel's shoulder, the left on its flank. The Hawk was struggling to retain its hold, the weasel to get free. The Hawk looked very solemn, and seemed to have undertaken a larger contract than it could carry out. Although the spectator stood within three yards of them, neither took the slightest notice of him. In the first attack the Hawk had not got sufficient grip. The weasel had too much play with its head and neck. The Hawk found some difficulty in guarding its leg, and made repeated lunges with its bill at the weasel's head, but these attempts the weasel always dodged, and countered by snapping at its enemy's leg. Finally the Hawk tried to fly off with the weasel, but could rise only a foot from the ground. It then fell back to the same place. The weasel made frantic efforts to free itself. It dragged the Hawk about four feet, but could not shake it off. The Hawk then seemed to realize that it must take decisive action. Drawing the weasel as close to it as possible, it made a furious blow with its bill on the weasel's head. The blow missed. Whether the Hawk slightly overbalanced itself or began to feel the strain of the struggle is not clear, but it was an instant too slow in recovering. Taking advantage of this, the weasel seized the Hawk's neck in its mouth. It seemed inevitable that the Hawk, unless rescued, would lose its life, and, as

settlers have suffered severely from the attentions of weasels, the spectator prepared to rush to the Hawk's assistance; but, with a squawk and wrench, it freed itself, leaving the weasel with a mouthful of feathers. As quick as lightning it released its grip of the weasel's shoulder and took a grip by the neck and an ear. The weasel now evidently regarded its position as very critical, and it uttered a succession of peculiar cries, which the Hawk seemed to accept as signals of defeat, as it began to bring the struggle to an end. With the grasp it had secured of the weasel's ear, it could hold its enemy's head in a suitable position, while it banged with its bill at the skull until a hole was made in it and the weasel became limp. So the fight ended, and then the feast began, and the victor was left to enjoy it in peace."

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**Deceit in Birds.**—"Are Birds Deceitful?" is the title of an article by Dr. A. G. Butler in the June, 1915, issue of the *Avicultural Magazine*. The answer to the question, the writer thinks, is that birds are deceitful when they have an object in view, but not otherwise.

"Thus we know," writes Dr. Butler, "from many recorded and well-authenticated instances, as well as from personal experience when we have tramped the country with our eyes open, that many birds will pretend to be crippled if one approaches their nests or young, or will dive into bushes or shrubs at some distance from the nest (passing quietly out on the other side) in order to deceive one as to its location.

"In like manner a malicious or predaceous bird will sit sleepily upon a branch until some weak and unsuspecting species settles within its reach, when it will suddenly pounce upon it. As I have elsewhere recorded, I had several unpleasant proofs of this in the case of a Rose-headed Parrakeet, which successively killed a Whinchat, Stonechat, and Skylark in this sly manner; in the case of the last-mentioned the Parrakeet may have been scandalized to see a Skylark sitting on a branch, though I have frequently seen another example which I kept in a different aviary sitting on a branch in the daytime; at night it always roosted on the earth.

"When, however, it is confidently asserted that birds deliberately disguise their nests with lichen, moss, bits of paper, &c., in order to render them inconspicuous, I am satisfied that those who make such assertions cannot have had much experience in searching for nests. It is quite true that such materials attached to the outside walls of nests do render them frequently less conspicuous than they would be otherwise, but they are not utilized by the builders with the object of deceiving, but because they are readily obtainable and perhaps appeal to the bird's æsthetic taste. . . .

"Of course, many birds do try to hide their nests, and I even on one occasion had that of the Skylark pointed out to me concealed by a piece of tangled water-weed loosely attached to one

side, so that it fell over the eggs and hid them from sight when the mother was from home. The presence of this water-weed at some distance from a dyke caused me to stoop and examine it closely, and thus I discovered the eggs. Whether this was a wilful attempt to deceive on the part of the bird may be open to question. . . . Eggs deposited in nests on or in the ground, or among pebbles or ground litter, are usually mimetic in colouring and extremely difficult to distinguish from their surroundings; but, unhappily, they are more liable than those built higher up to destruction by stoats and other ground-frequenting vermin.

"It is extraordinary how men who become obsessed with a theory will try to strain every known fact into its service. The fact that the egg of our common Cuckoo not infrequently resembles the eggs of its foster-mother is assumed to be with the object of deceiving her; but when we know that by far the greater number of Cuckoos' eggs in no wise resemble the eggs among which they are deposited, this notion at once disproves itself. Nobody really knows why some Cuckoos' eggs are such admirable copies of those with which they are placed, but it has been suggested that if a Cuckoo is reared by a Hedge-Sparrow or any other bird, she will probably lay in the nest of that bird, and that similar feeding for many successive generations may affect the colouring of the eggs. I don't know, and that is about as far as most of us will ever get in explaining many of Nature's secrets; and if the truth is ever revealed, we shall discover that many of the explanations suggested are miles away from it."

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## Correspondence.

### DISTRIBUTION OF AUSTRALIAN BIRDS.

To the Editors of "The Emu."

SIRS,—My attention has been directed to Mr. Frank E. Howe's letter\* about the lack of knowledge regarding the geographical distribution of our species. Mr. Howe furnishes for "corrections and omissions" a list of 27 species, or, rather, mostly sub-species. If Mr. Howe refers to their names or equivalent names in the "Official Check-list of the R.A.O.U." I think he will find that all the localities (States, at least) that he has mentioned are recorded, save in one doubtful instance.

Regarding the Friar-Bird (*Tropidorhynchus corniculatus*) being found at Ferntree Gully (Vic.), Mr. A. J. Campbell † records that he took a nest with eggs in that locality in 1870. May I ask where is the reference for *Tyto longimembris walleri*? The use of bald, Cerberus-headed, previously-unheard-of names may prove a serious drawback in Australian ornithology.—Yours, &c.,

Melbourne, 20th November, 1915.

A. G. CAMPBELL.

\* *Emu*, vol. xv., p. 71.

† "Nests and Eggs," p. 433.

## The Campbell Oological Collection.

AUSTRALIAN ornithologists will learn with great interest that Mr. A. J. Campbell, Col. M.B.O.U., has presented to the National Museum, Melbourne, his fine collection of birds' eggs, valued at £600. He has set a splendid example to other owners of oological collections.

In the course of his letter to Prof. W. Baldwin Spencer, Director of the Museum, Mr. Campbell said:—"It has been my intention for many years to dedicate my Australian oological collection to the National Museum, and the time appears opportune now for me to hand the collection over, if the trustees of the institution are prepared to receive it. The collection contains the eggs of about 600 kinds of Australian birds, and my work, 'Nests and Eggs of Australian Birds,' was principally built upon the collection, the majority of the species having been collected personally in various parts of the Commonwealth."

Professor Spencer, in a letter to Mr. Campbell, wrote:—"I beg to acknowledge your letter of 7th December, in which you convey the information that you propose to donate your well-known and very valuable collection of birds' eggs to the National Museum. It is all the more valuable because it is so intimately associated with your work on 'Nests and Eggs of Australian Birds,' and will prove a notable addition to the national collection of natural history. Your most generous offer will be gratefully accepted by the trustees, before whom it will be laid at their next meeting, when a formal acknowledgment will be made. Meanwhile, I write to express our great appreciation of your gift."

On 22nd December, 1915, members of the R.A.O.U. Council and of the Bird Observers' Club viewed the collection at the National Museum, and then adjourned to a tea room, where Mr. Campbell, the host, and others made brief speeches.

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### Roll of Honour.

MEMBERS of the Union who answered the call of Empire in the great war include the following:—Victoria.—J. Anderson, Dr. J. W. Barrett, Lieut.-Col. H. W. Bryant, L. G. Chandler, Rev. Walter Dexter, G. Finlay, Lieut.-Col. G. Horne, A. M'Kenzie Kirkwood (killed), Col. C. S. Ryan, A. M. Sullivan, Lieut.-Col. J. M. Semmens, M. Thompson, Surgeon-General W. D. C. Williams, F. E. Wilson, H. W. Wilson, R. L. Walton. South Australia.—R. Crompton. Tasmania.—A. W. Swindells. Western Australia.—C. H. Van der Pfordten.

## "The Emu."

IN this number we publish a coloured figure of the White-throated Shrike-Robin. The generosity of that enthusiastic bird-lover and keen ornithologist, H. L. White, Esq., of Belltrees, Scone, is responsible for that important development of our illustrations. He offered to pay half the cost of a coloured plate in each number of *The Emu* on condition that members contributed the other half of the cost, which totalled approximately £36 a year. Members have now provided annual donations of £18, and Mr. White has sent his cheque for £18 for the present volume.

Through an oversight, no acknowledgment was made that Professor Baldwin Spencer, Director, and Mr. J. A. Kershaw, Curator, of the National Museum, Melbourne, had kindly provided and mounted the specimen of the new Honey-eater, *Macgillivrayornis claudi*, figured in the October issue of this journal. We take this opportunity of apologizing for the omission.

A recent criticism stated that *The Emu* was neglecting popular ornithology and was becoming too technical. The editors are keenly alive to the necessity of developing popular interest in Australian birds, and have not lost sight of that plank in the Union's platform. All papers dealing with the popular side of ornithology that have reached the editors have been printed in full. This year we have had the good fortune to obtain two valuable scientific papers from Dr. Shufeldt, the veteran American ornithologist. Writing from Washington, U.S.A., he states that he considers *The Emu* "one of the best of the numerous ornithological journals" that come to his table. It is pleasing to the Council that a scientist of Dr. Shufeldt's standing should do us the honour of contributing to our pages. Dr. Shufeldt is an honorary member of the R.A.O.U. Articles dealing with the habits and life of birds will be welcomed.

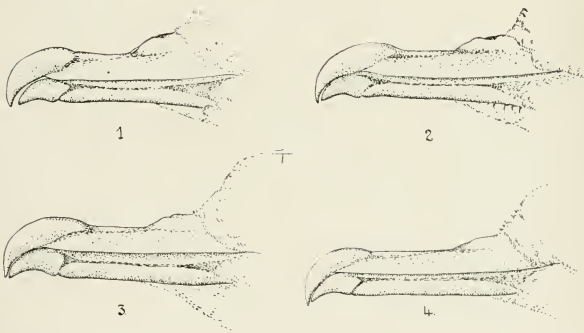
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## Royal Australasian Ornithologists' Union.

THE following office-bearers have been elected for the year 1915-16:—President, Captain S. A. White, M.B.O.U.; vice-presidents, Dr. W. Macgillivray and Dr. J. A. Leach, Col. Mem. B.O.U.; hon. secretary, Mr. W. H. D. Le Souëf, C.M.Z.S., &c., Zoological Gardens, Melbourne; hon. treasurer, Mr. Z. Gray, L.C.A., 190 Bridport-street, South Melbourne; hon. librarian, Mr. W. H. D. Le Souëf, C.M.Z.S., &c.; hon. editors of *The Emu*, Dr. J. A. Leach, Col. Mem. B.O.U., and Mr. Charles Barrett, C.M.Z.S.; associate co-editor, Mr. A. J. Campbell, Col. Mem. B.O.U.; hon. press correspondent, Dr. Brooke Nicholls; hon. auditor, Mr. J. Barr, A.I.A.V.; printing committee, Messrs. W. H. D. Le Souëf, A. H. E. Mattingley, and A. C. Stone.

Local State secretaries:—Mr. A. S. Le Souëf, C.M.Z.S., Director Zoological Gardens, Sydney; Mr. E. M. Cornwall, Mackay, Queens-





- 1.—Bill of *Neonectris tenuirostris brevicaudus*.
- 2.—Bill of *Neonectris tenuirostris grantianus*.
- 3.—Bill of *Neonectris tenuirostris intermedius*.
- 4.—Bill of *Cinathisma cyaneoleuca*.

land; Mr. J. W. Mellor, Lockley, Fulham, South Australia; Mr. W. B. Alexander, M.A., Cottesloe, Western Australia; Mr. W. L. May, Sandford, Tasmania; Mr. W. R. B. Oliver, H.M. Customs, Auckland, New Zealand; Mr. G. F. Hill, F.G.S., Darwin, Northern Territory.

Members of Council:—Victoria, Col. C. S. Ryan, Messrs. A. H. E. Mattingley and A. C. Stone; New South Wales, Dr. J. Burton Cleland and Mr. A. F. Basset Hull; Queensland, Mr. C. A. Barnard; South Australia, Dr. A. M. Morgan; Western Australia, Mr. A. E. Le Souëf; Tasmania, Col. W. V. Legge, Col. Mem. B.O.U.

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## Description of two New Petrels.

BY A. F. BASSET HULL, R.A.O.U.

(Published in "Bulletin No. 5" of the R.A.O.U., 21/12/15.)

THE birds here described were taken during a visit to Murrumurang Island (otherwise known as Brush Island), south of Ulladulla, New South Wales. *Cinathisma cyaneoleuca* occurred in considerable numbers, two separate flocks being encountered on the open sea, and five specimens (three male and two female) were secured. This bird has a remarkable short fluttering flight, quite unlike that of any other members of the *Puffinidæ* common to the New South Wales coast. *Neonectris tenuirostris grantianus* was found dead on the beach at Ulladulla and on Brush Island in large numbers. Most examples were decomposed, but identifiable by the short tail. Two dead, but perfectly fresh, specimens were secured (one at each locality), and proved to be male and female. I associate this sub-species with Messrs. Robert and Henry Grant, the taxidermists to the Australian Museum, both of whom have frequently accompanied me on my island trips, and prepared the skins of all specimens taken.

### *Cinathisma*, gen. nov.

Differs from *Puffinus* in the stronger bill, shorter in proportion to length of bird; shorter wing, tail square (not rounded); rectrices, 9.

### *Cinathisma cyaneoleuca*, sp. nov.

Whole upper surface and flanks dark slaty-blue, feathers of flanks, wing and tail coverts margined with white, the lesser wing coverts more distinctly margined; under surface white; sides of neck dark slaty-blue, in some specimens extending more than half-way across the throat, gradually merging into the white. Total length, 13 to 13½ inches; wing, 8 inches; tail, 3 inches; culmen, 1½ inches; tarsus, 1½ inches; middle toe and claw, 2 inches; inner toe, 1½ inches.

Coloration of soft parts:—Iris hazel; bill, upper mandible lead

colour, black line on top; lower mandible bluish; nail black; feet, interdigital membrane lead colour margined with black, under side black; outer toe black, middle toe with black spot on each joint; claws black.

Both sexes are alike in plumage.

Type locality, Ulladulla, N.S.W.

***Neonectris tenuirostris grantianus*, sub-sp. nov.**

Differs from *N. t. brevicaudus* (Gould) in its larger size, more robust bill, and light ashy colour of the chin and neck; the throat and abdomen are lighter, and the light and dark shades of the upper surface are more marked. Differs from *N. t. intermedius* (Hull) in its shorter and less robust bill, and generally smaller size. Total length, 16½ inches; wing, 11¼ inches; tail, 3½ inches; tarsus, 1½ inches; culmen, 1½ inches; interdigital membrane lead colour, with sooty margins; outer toe black; tarsus lead colour inside, sooty outside.

Both sexes alike in plumage.

Type locality, Ulladulla, N.S.W.

Type skins in collection of Mr. H. L. White, Belltrees, N.S.W.

The differences in the bills of the three species are clearly shown in the accompanying illustration.

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### A Valuable Offer.

A WELL-WISHER of ornithology has offered, without condition, a cash donation of £1,000 for the purpose of procuring a central room where members of the R.A.O.U. may meet, work, and discuss ornithological problems. Members have taken up the matter enthusiastically, and it is hoped that soon the valuable library and working collections of skins, eggs, and nests will be available in a convenient place. The Council highly appreciates this handsome offer. The donor has asked us not to mention his name.





THE FLUTTERING PETREL  
*Cinathisma cyaneoleuca.*

# The Emu

Official Organ of the Royal Australasian Ornithologists' Union.

"Birds of a feather."

VOL. XV.]

1ST APRIL, 1916.

[PART 4.

## Avifauna of New South Wales Islands.

BY A. F. BASSET HULL, R.A.O.U., SYDNEY.

### PART III.\*

IN his "Birds of Australia" Mathews separates the western from the eastern form of the Wedge-tailed Petrel (*Puffinus sphenurus*, Gould). The former he catalogues in his 1913 "Hand-list" as *Thyellodroma pacifica chlororhyncha*, Lesson, and the latter as *T. p. royana*, Mathews. He describes the western form as differing from the eastern "in its generally lighter colour, especially on the under surface, and probably also in the coloration of the bill." He quotes Gould's description of *P. sphenurus*, in which the bill is stated to be "reddish fleshy-brown, darker on the culmen and tip; legs and feet yellowish flesh colour." Gould's type came from Houtman's Abrolhos, Western Australia, and Lesson's type from Shark Bay, W.A. Mathews says:—"Coues, with Gould's specimens in front of him, wrote: 'The bill is flesh colour, tinged with brown; much darker along the culmen and on the unguis.' Hall states that the bill is slate colour, with the tip or nail black, and now Campbell and White aver that the western form has the bill the same colour as the eastern, which they call 'dark horn or bone-brown.' As the characters of these dark *Puffinus* lie mainly in the bills, further investigations are necessary, and a series of birds studied." Mathews's figure of *T. p. royana* (lettered *Puffinus chlororhynchus*) shows the bill a fleshy-pink colour, with black unguis, the feet and tarsi being flesh colour. These details agree with the description of the adult bird quoted from Campbell and White. Mathews gives the range of the eastern bird as "Eastern Australia, Lord Howe and Norfolk Islands." He refers to a bird from Broughton Island (N.S.W.), sent to him by me for examination, which "has quite a small bill, the coloration of which, in the dried state, seems to be darker on the unguis, and not all uniform as given by Messrs. Campbell and White, though otherwise agreeing closely."

It appears to me that Mathews separates these two forms on the too unstable characters of the coloration of the soft parts in the dried skin. I have examined some hundreds of the eastern

\* *Vide Emu*, vol. xi., p. 202 (1912).

form in a living state, and found considerable variation in the shade of colour of the feathers, the under surface particularly showing a range from light to dark. The bill and feet, however, never vary in the living bird, except as regards the size and thickness of the bill. This is always a dark lead-colour, frequently bright and polished with the oil from its food, the tip black. The tarsi are of a livid or pale lead-colour, the feet fleshy-white, with coloured veins showing in the interdigital membrane; the toes white. The dried skins often lose much of these distinctive colours, and some specimens taken by me have developed a brownish horn-colour in both bill and feet, while others retain the lead-colour of the bill.

Mathews quotes Dr. Ramsay's identification of the Solitary Island (N.S.W.) bird as *P. carneipes*, and North's identification of the skin from South Solitary Island as *P. chlororhynchus*.

During the season of 1911 I was in correspondence with Mr. D. Gow, then the principal lighthouse-keeper on South Solitary Island. Mr. Gow kindly sent me a number of eggs and the skin of an immature bird, undoubtedly the Wedge-tailed Petrel. He stated that he had made an exhaustive search over the island, and could not find any other species breeding there.

As the eastern form has a very wide range, extending from Montague Island, 150 miles south of Sydney, to Raine Islet, in Torres Strait, I think that a fuller examination of series will disclose more than two races or sub-species of this bird.

On 1st December, 1913, in company with Mr. Henry Grant, I visited North Coff's or Mutton-Bird Island, which lies about a quarter of a mile off Coff's Harbour jetty and nine miles south of South Solitary Island. The island is barely a quarter of a mile in length, high and rugged, with a thin covering of soil on top. Tussocks of grass grow in patches, where the soil is deep enough, and where it is only a few inches in depth there are patches of *Mesembryanthemum*. With the exception of two small patches of cane, and a few salt-bush plants, there is no other vegetation on top of the island, although ferns and a creeper with thick, fleshy leaves cover the steep slopes on the western side. Here we found the Wedge-tailed Petrels packed closer together than in any other locality I have visited. Every available foot of soil was burrowed, and the burrows occupied. The soil is so shallow that the covering barely sheltered the birds, and in many instances they were visible from the entrance. Some hundreds of eggs were lying exposed on the open ground at the entrances to occupied burrows, and it appeared to me that there were more claimants for house-room than houses! The eggs were all quite fresh. The fisherman who accompanied us said that the birds always laid their eggs on the 25th November. It is quite possible that some lay on that date, but I think that the bulk are laid on the 27th November, the date observed in other Mutton-Bird rookeries.

The only other species found breeding on this island was the

Pectoral Rail (*Hypotaenidia philippensis*). I saw two pairs of birds, and flushed one bird from a nest containing five eggs. If the proposed harbour works are carried out at Coff's Harbour this island will be connected to the mainland by a breakwater, and the existing crowded rookery will inevitably disappear.

We were unable to visit the Solitary Islands, as heavy weather set in on the day following our visit to Coff's Island. North Solitary is practically inaccessible, and landing on South Solitary is only possible in the finest weather.

On 6th December, 1914, I revisited some of the Five Islands off Wollongong, N.S.W., our party including Messrs. Henry Grant and S. E. Rohu. The weather was fine, and there was no wind when we put out from Perkins Beach, near Port Kembla, in a heavy fisherman's boat. We easily effected a landing on Pig Island, and there found the Little Penguin (*Eudyptula minor*) with eggs, fresh or in various stages of incubation, or young birds. Guthrie-Smith says the eggs of the New Zealand species (*Eudyptula albosignata*), when first laid, have a small patch of brightish green on the larger end. An egg of this species in my collection, taken by Tom Iredale near Lyttelton in 1905, evidently quite fresh when taken, shows no green spot. Having Guthrie-Smith's statement in mind, I carefully examined the fresh eggs of *E. minor*, but only one specimen showed any green colour (not obviously acquired after laying from contact with crushed leaves or excreta), and this specimen still retains the green spot (1916).

In addition to the Penguins, there were Wedge-tailed Petrels (*Puffinus sphenurus*, Gould) and White-faced Storm-Petrels (*Pelagodroma marina*, Latham) in their burrows under the matted *Mesembryanthemum*, *Convolvulus*, and salt-bush. The former had fresh eggs, and the latter in most instances young birds, although a few burrows contained eggs heavily incubated. On my previous visit (October, 1909\*) the Storm-Petrels' burrows contained fresh or slightly incubated eggs.

We then made for the outermost island, and were able to approach within a few yards of the shore. This island is very small, not more than an acre in extent, shaped like a dish-cover, the smooth rocks sloping gently down under the surge that even in the finest weather sweeps all round it. It was simply covered with Gulls (*Larus novaehollandiae*, Stephens) and Terns (*Sterna cristata*, Stephens), screaming at the approach of strangers and squabbling amongst themselves. We were unable to land, however, having no small dinghy to run up on the sloping rocks, and the fishing-boat being too deep in the water, and heavy, to take closer in. Perhaps it was just as well that we did not stay to make the attempt, for shortly after shaping a course for Rabbit Island, which lies close in shore, a strong breeze sprang up from the west, and we had a strenuous hour of pulling against it before we reached a bay under the lee of the mainland. Here we landed, and found

\* *Emu*, vol. xi., p. 100 (1911).

the Wedge-tailed Petrels and Penguins occupying the greater part of the island, where the sand-dunes and tussocky grass gave them fine cover. This island is high and rocky on the eastern side, and a narrow neck, surf-swept in heavy weather, separates it from a second lower and more rocky island; while off the extremity of this second island lies a high, rocky islet, almost inaccessible. Mr. Rohu had managed to land on the islet in February, 1914, and there found a few Wedge-tailed Petrels with young birds in their nesting burrows in a small patch of soil. Among them he found one young bird which had a whitish breast, and he also shot and secured an adult white-breasted bird on the water in the vicinity. These birds were disposed of by Mr. Rohu as *Puffinus gavia*, the then accepted designation of the White-breasted Petrel, of which several specimens had been picked up dead or dying near Sydney. We were unable to effect a landing on the islet, and a search in a very large number of burrows on Rabbit Island failed to disclose anything but Penguins and Wedge-tailed Petrels.

I had long wished to visit Brush Island, lying about midway between Ulladulla and Bateman's Bay. On my visit to the latter place in 1911\* I had made inquiries as to means of access to and probable inhabitants of this island. The local tradition was strong on Quail. "Flocks of 'em," was the general tale, and "Pengwins—stacks of 'em." After several attempts to arrange a trip during the three following years, I at last got off with Mr. Henry Grant on 4th December, 1915. Our journey was from Sydney to Nowra by train, thence to Ulladulla *via* Milton by motor. We arrived at the seaport on Saturday evening, in time for a stroll along the ocean beach before tea. After inspecting the launch we had engaged to take us out to the island on the following day, we walked south, and at once came upon several dead Petrels in rather advanced stages of decomposition. A glance was sufficient, however, to show that they were not Wedge-tails, the tail feathers being short and square. Further search resulted in our finding an almost perfect specimen, slightly decomposed on the under side only. The species was easily identifiable as *Puffinus brevicaudus*, Gould; but, after taking measurements, I found that it was larger than typical specimens of the Tasmanian "Mutton-Bird," but not quite so large as the dark-plumaged bird I found at Cabbage-tree Island in 1910 and named *P. intermedius*.† After tea we walked along the sandy beach of the harbour, finding many more dead Petrels of the same species, most of which had evidently been dead for many days. By great good fortune we found one awash in the surf, apparently quite recently dead, and this specimen Mr. Grant subsequently skinned.

Day broke on Sunday dull and cloudy, with a drizzling rain, which ceased shortly after we left the port at 6 a.m. Another dead Petrel was seen floating off the breakwater, and the fisherman who owned the launch told us that they had been coming

\* *Emu*, vol. xi., p. 202 (1912).

† *Emu*, vol. xi., p. 98 (1911).

in on the beaches along the coast in hundreds for some weeks past.

When about six miles from Ulladulla, and two miles off shore, we encountered quite a number of Petrels, many of which were the black Shearwaters or Mutton-Birds, both Wedge-tailed and Short-tailed being recognizable. But sitting on the water were numbers of a smaller bird, a stranger to me. As we ran amongst them they rose with a peculiar short fluttering flight, more like that of a Teal than any other bird I have seen rising from the water. Their white breasts and necks showed clearly as they rose, and Grant shot one, which we soon had under examination. It appeared to me to be *Puffinus gavia* (*Reinholdia reinholdi byroni*, Mat.), and I labelled it as such for the time being. The colour of the upper surface, however, was entirely different from that figured by Mathews under the name of Brown-backed Petrel. The freshly-killed bird was of a deep slaty-blue—the colour of the sea under a lowering sky. When subsequently selecting a specific name for this bird I long hesitated between "*cheimera*" ("the stormy or wintry sea") and "*cyaneoleuca*," which I finally adopted. This blue colour was very marked, and accompanied by a rich bloom, like that of a ripe plum. The bloom has now disappeared entirely, and the blue has become dull and lifeless; the whole appearance of the bird has changed. I have noticed the same loss of colour in the skins of the White-winged Petrel, and of the rich gloss or bloom of the Wedge-tailed and Short-tailed Petrels, but in no former instance was the change so marked.

Mr. Grant secured two more birds before we had passed through the flock, which flew seaward as we disturbed the individuals, possibly 100 in all. About a mile further on we ran into another flock of these birds, and secured two more specimens. Thinking that we were on the right track for their nesting-place, I did not consider it necessary to take any more by shooting; besides, there was a fairly heavy swell, and it sometimes took two or three turns of the launch before we could pick up our birds, and time was a valuable consideration.

We soon sighted Brush Island, and arrived at a safe anchorage at 8.30 a.m., the distance from Ulladulla being close upon 15 miles. The island is long and narrow, about 80 acres in extent, high in the centre, and thickly covered with *Casuarina*, *Banksia*, small eucalypts, and undergrowth, chiefly consisting of a salt-bush (*Rhagodia billardiera*). The native name of the island is Murramurang, and it lies barely half a mile off Murramurang Head, an old-time camping-ground of the blacks, with one of the most extensive kitchen middens on the coast.

Immediately upon landing we found our old friends the Little Penguins engaged, as usual, in what appears to be their all-the-year-round occupation of reproducing the species. Burrows and crevices amongst the rocks contained either fresh eggs or young birds, incubated eggs or big, pot-bellied chickens, with a mere collar of down left to distinguish them from their parents. The

Wedge-tailed Petrels were there also, their burrows and those of the Penguins being somewhat mixed up close to the water's edge. A wide belt of tussocks, salt-bush, and rank growths of thistles and other introduced weeds follows the shore-line, and this belt was fairly infested with the two birds mentioned. The Petrels were all sitting on fresh eggs. In one spot we found four dead Short-tailed Petrels, which had evidently been partly eaten by Crows or Hawks, lying outside the entrances to burrows tenanted by the Wedge-tails, and in a rock-pool just outside the fringe of vegetation we found another Short-tailed bird, apparently just dead. This specimen was also skinned, and forms the type of *Neonectris tenuirostris grantianus*, described by me in the January issue of this journal (p. 206). Just above the thick scrub, on a patch of sand, I found an egg, quite fresh, but perforated by a pebble, as if it had been dropped from a height of a few inches rather than laid on the ground. This egg measured 71 x 45 mm., and was, I believe, dropped by a Short-tailed Petrel, the size and the texture of the shell being in close resemblance to those of the Tasmanian and Victorian birds. The largest egg of the Wedge-tailed Petrel taken on the island measured 65 x 41 mm., while the smallest egg of the same species measured 54 x 37 mm.

Instances of dead Petrels coming ashore on the New South Wales coast in quantity are numerous, and various theories have been advanced to account for the phenomenon. Starvation, disease, storms, have all been suggested to account for the untimely death of the birds. The two specimens of the Short-tailed Petrel taken by us were found to be badly nourished, and their stomachs were empty, but there was no sign of injury which could have caused death. I advance, with some diffidence, a further theory, that these smaller and less combative birds, trying to establish themselves in the rookeries of the Wedge-tailed birds, are driven off, buffeted, and harried until they die from exhaustion or starvation. Further investigation, and examination of the blood, stomachs, and intestines of freshly-dead specimens, may reveal the cause of death with greater certainty.

We made a thorough examination of the island, searching every likely patch of soil and cover for indications of the nesting-places of other birds, but found none. The White-breasted birds were not represented. Where the flocks we saw have their breeding-place remains to be discovered. The specimens taken were adult, but in some instances the moult was not complete, one bird, a female, having brown patches on the wings. The ovaries of the females did not indicate that the laying season was approaching. On opening them Mr. Grant found their stomachs and crops crammed full of small mackerel, from a fresh one in the mouth or throat to almost completely digested ones in the stomach. The bodies of all the specimens were well nourished and fat. Externally they were covered with *Mallophaga* (*Menopon*, sp.)

Other birds seen on this trip were *Sterna cristata*, Steph., *Larus novæ-hollandiæ*, Steph., *Sula australis*, Gould, and *Chenopsis atrata*,

Latham, on the sea, the last-named in large numbers just off Tebowrie Head: and on the island, *Hæmatopus fuliginosus*, Gould, (adult pair and one young bird), *Synoicus australis*, Temm. (many adults and a dozen chicks), *Demigretta sacra*, Gmelin, *Anthochæra carunculata*, Latham, *Anthus australis*, Vig. and Hors., *Megalurus gramineus*, Gould, *Rhipidura motacilloides*, Vig. and Hors., *Zosterops dorsalis*, Vig. and Hors., *Cracticus destructor*, Temm., and *Corvus* (? sp.)

I have in this paper adhered to the "Check-list" nomenclature, but in describing the two birds found on the Brush Island trip\* I followed Mathews's "Hand-list" for the new sub-species of the Short-tailed Petrel, and ventured to place the "Fluttering" Petrel in a new genus, thus departing from the principles of the "Check-list," but following Mathews. Possibly, when the new "Check-list" is prepared, and further investigation reveals more of the life-history and habits of the Fluttering Petrel, some alteration may be necessary. I here take the opportunity of correcting an error in the generic characters of *Cinathisma cyaneoleuca*. The number of rectrices should be 12.

It is somewhat remarkable that we should have encountered such large numbers of the Fluttering Petrel, in view of the fact that *Puffinus gavia* (*Reinholdia reinholdi byroni*, Mathews) is considered to be a very rare bird indeed, and the two white-breasted birds might easily be taken for the one species by superficial observers. The records of occurrence of *P. gavia* are four only,—the first being a living bird, picked up after a storm at Victoria Park, Sydney, by Professor Anderson Stuart, and by him presented to the British Museum;† the second was picked up dead on Bondi beach by Mr. William Barnes, after an easterly gale, in September, 1908,‡ the skin of which was exhibited at a meeting of the Linnean Society, of New South Wales, by North, in 1909; the third was Mathews's type, which, I understand, was also picked up dead on one of the northern rivers; while the fourth occurrence was the specimen found by Rohu at the Five Islands (see *ante*).

By the courtesy of Mr. Sylvester E. Rohu I am enabled to add to this paper a transcript of some notes compiled from observations taken over a period of eighteen months—April, 1913, to September, 1914—by Messrs. E. A. Windle and W. Newton, fishermen working between Broken Bay and Botany Bay, New South Wales, and Mr. Rohu. These notes are of great value as showing the periods of greatest frequency of the species mentioned within the area in question, and throw valuable light on the problems connected with their breeding seasons. The nomenclature is that adopted by Mr. Rohu, and it is only necessary to suggest that the "*Puffinus assimilis*" mentioned in the list probably refers to both of the white-breasted Petrels—*Reinholdia reinholdi byroni*, Mathews, and *Cinathisma cyaneoleuca*, Hull.

\* *Emu*, vol. xv., p. 205 (1916).

† *Proc. Linn. Soc. N.S.W.*, vol. xxxiv., p. 418 (1909). ‡ *Ib.*

It also affords me much pleasure to present the readers of this journal with a remarkable photograph of an Albatross rising from the water inside Port Jackson, near the pile light off Watson's Bay. This striking picture was taken by Mr. J. Degotardi, the photographer to the Public Works Department, in the summer of 1912. Visits of these noble birds to Port Jackson are by no means uncommon, and I have seen several when journeying from Sydney to Manly. It is possible that some records of *Gabianus pacificus* as visitors to the port are the result of a mistaken identification of *Diomedea melanophrys*. I have travelled daily from Manly to Sydney for a number of years, but have never seen the Pacific Gull on the waters of Port Jackson, nor have I met with it during any of my numerous trips to the harbours and islands of our coast from Montague Island to Coff's Harbour.

#### A SUMMARY OF SEA BIRDS NOTED ON THE COAST BETWEEN BROKEN BAY AND BOTANY BAY, N.S.W.

**Eudyptula minor.**—Seen occasionally in singles. Were found breeding on the mainland at Narrabeen, a little north of Manly, their burrows situated under a fisherman's hut. This little rookery was composed of half a dozen adult birds. It is a strange fact that during the breeding season this hut was occupied by the fisherman.

**Pelagodroma marina.**—These were noted in fair numbers towards evening, making north, possibly to Broughton Island, where they have a very large rookery. These migrations north were noted during October, January, and February; other times of the year they were only seen occasionally.

**Oceanites oceanicus.**—Only two of these birds were noted, and in October, 1913, one of these specimens was shot. We were told by several fishermen that some eight or nine years ago these birds were noted only in pairs, but were very numerous.

**Puffinus sphenurus.**—Noted January and February, absent March, April, May, and June; returning July, August, and October. During these three months they are collected in thousands, following the schools of porpoises.

**Puffinus tenuirostris.**—The observations of these are very similar to the foregoing species, but in November and December they migrate in thousands towards the south.

**Puffinus assimilis.**—These birds are first noted at the beginning of July, and increase in numbers until November, when they are very numerous. They begin to leave these shores in December; they appear to follow the track of the porpoises when they are feeding on the vast shoals of pilchards. They make north at this time of the year.

**Æstrelata leucoptera.**—Only two of these birds have been noted, and these were flying and feeding with the other *Puffinus* specimens.

**Ossifraga gigantea.**—Are first noted at the beginning of July, August, to the first week in September, but it is only after very heavy weather that they are seen. Immediately the seas go down these

birds disappear, only to return after the next storm, but at no time are they numerous. Windle says that when they are about there would be one of these birds to 250 specimens of Albatross. Windle also states that on one day he shot a Wandering Albatross, and it soared a distance of about half a mile before falling, and before he had time in his motor launch to come up to it a Giant Petrel had swooped down on this bird, had torn the breast open, and devoured a good deal of the flesh. It had torn the specimen about so much that it was of no use. From these observations Windle has learned to decoy these birds by shooting an Albatross and tearing the skin away from the breast, and setting it about 50 yards away from his boat when he is fishing. He says if there is any Giant Petrel in the vicinity it is not long before it swoops down upon the bait. A white specimen was collected on the 3rd of September, 1914.

**Prion ariel.**—Only one of this species was noted, and it was procured in August, 1914. This bird was enticed to come right up to the boat by throwing pieces of fish into the water whilst it was circling overhead.

**Diomedea exulans.**—These birds are noted from June until November. August, September, and October are the months when they are very numerous. They generally follow the mail steamers up the coast in large numbers, and the same birds have been noted to stay within the vicinity of Sydney Heads for perhaps a week.

**Diomedea regia.**—Only one of this species has been recorded, and that was in July, 1913, but this should not be taken to imply that they are not more numerous, as this bird was taken when we were collecting *D. exulans*. There is very little difference to be noted in these birds whilst in flight; perhaps this has been the reason for only one specimen being taken.

**Diomedea cautus.**—These birds are noted in June, July, and August; in July they are very numerous.

**Diomedea chlororhynchus.**—Are to be seen from March until December, and are to be classed as being the most common of the *Diomedea* found on the coast of New South Wales. In proportion to all other species of the Albatross family, it would not be exaggerating to say that the *D. chlororhynchus* would outnumber the others by three to one.

**Diomedea** (? sp.; yellow-beaked, with yellow eyes).—Are noted in June, July, and August; after August not one is to be seen.

**Diomedea** (? sp.; grey head and grey neck).—These birds seem to take the place of the foregoing species, and are only noted after the others have disappeared; these continue to be seen up till the beginning of December.

**Diomedea culminatus.**—This bird, during the period of these observations, has not been noted, although a strict outlook has been kept for same; this also applies to *Phaebetria fuliginosa*.

**Sterna bergii.**—These are always numerous off Sydney Heads, with the exception of the months of October and November; during these months we consider these birds, from Newcastle locality and along this portion of the coast, adjourn to the Five Islands, South Coast, to breed, but during the period of breeding of these birds there is an occasional one to be seen.

***Sterna frontalis.***—This bird is only noted for two months in the year—July and August. It is always to be seen diving for its prey close in to the rocks. During these months we estimate that the total of this species within a range of 20 miles of Sydney would not be more than about 150 birds.

***Larus novæ-hollandiæ.***—These birds, like the *S. bergii* are always to be seen, but are less numerous during the months of September, October, and November, when they are away breeding. Their closest rookery to Sydney known to us is at Five Islands, in the south.

***Megalestris antarctica.***—May is the first month that these birds make their appearance. They are to be seen in singles and in pairs up till the end of August. They are known to all the fishermen and sailors alike on the coast of New South Wales as the Sea-Hen or Sea-Hawk.

***Stereorarlus crepidatus.***—Immediately *M. antarctica* disappears this bird takes its place, and is noted up till about the end of January. Windle seems to think that the birds that come to this coast within the radius of 20 miles of Sydney remain in the same locality until the time they take their departure. He comes to this conclusion mainly on account of the various markings of their plumage. He estimates in this radius that during these months there would be about 20 of these birds. On one occasion we saw as many as eight Skuas tackling a Tern. When the Tern had dived for its food, and was flying away with it, the Skuas would come from everywhere and join in the chase; previous to the diving of the Tern there could not be seen any trace of them. Some of these chases would continue for half a minute, and in other cases for many minutes, before the victim disgorged its food.

***Demiegretta sacra.***—Three pairs of these birds seem to occupy the coast-line from Botany Bay to Broken Bay.

***Phalacrocorax carbo.***—Noted from May until November only in singles; in December and January they are noted in pairs; the end of January they begin to show their breeding plumage.

***Phalacrocorax melanoleucus.***—Are noted all the year round.

***Phalacrocorax gouldi.***—Noted during May, June, and July, but only in singles. The nearest rookery of these birds known to us is on the South Rock, Broughton Island, N.S.W.

***Sula serrator.***—Noted all the year round, and very plentiful from August until December, when they are following the huge shoals of pilchards making north.

***Haliaëtus leucogaster.***—There is a pair of these birds which breed annually on the north-east point of Kuring-gai Chase that juts into Broken Bay. This pair of birds seem to have practically the whole of the coast-line from Broken Bay to Botany Bay to themselves.





Fig. 1.



Fig. 2.

## Some Considerations on Sight in Birds.

BY DR. J. C. LEWIS, R.A.O.U., MELBOURNE.

THAT continual adjustment, so necessary for life, between internal relations of an organism and the external world would be impossible were it not for the communion of the sense organs. They stand, as it were, midway between the organism and its surroundings, keeping the internal relations aware of and alive to the external happenings and conditions. These functions probably arose with the necessity for adaptation to environment and its ever-changing demands, and in the struggle for existence they are necessary factors for the survival of the race.

Of the different special senses, hearing and sight stand apart in the degree of specialization; and this specialization, again, varies greatly in the divisions of the animal kingdom. In the animal world, for example, we find all stages, from blindness to acute vision. Where the sight is poor, smell and hearing are, in compensation, extremely acute. The vision of the rhinoceros is limited to some 50 yards or so, and is poor even for that short range; but the acuteness of the sense of smell makes good the sight deficiency. In birds, specialization of sight reaches its highest degree of development, and, though hearing is fairly acute, the sense of smell is certainly vestigial. One feature of the functions of hearing and sight is the projection of their sensory impulses. Taking sight, we find that light reflected from a distant object is picked up by the cornea and lens and brought into focus at a point on the retina. The stimulation of the numerous endings of the optic nerve sets up an activity which, after passing through many systems of relays, reaches the sight centres in the brain, giving rise to a complex chemical action in the cells, where the myriad impulses are figured out into a light pattern in the image of the original object. Though the action setting up these impulses originates in the brain, where the image is really synthesized, the sensation is projected to the object from which the light is reflected. A similar projection occurs with the function of hearing, though perhaps not so definite in its localization.

If we consider the eye as an optical apparatus, looking at it from a mechanical point of view, we find that it can be likened with advantage to a camera, the convergence of rays being brought about by the lens and the cornea, the retina taking the place of the sensitized plate. This convergence of the diverging rays of light into focus on the retina from objects at varying distances is termed accommodation, and corresponds roughly to the focussing of a camera. The process of accommodation differs greatly in the different classes of the animal kingdom. In terrestrial forms, where there is media of very much less density outside the eye—namely, the air—the principal convergence is done by the cornea, the outer transparent covering of the eye, the amount of convergence depending upon the laws of refraction governing light passing from a less dense to denser media.

Though the lens also acts to a lesser extent in the same way, the corneal convergence is the more important in these forms, the special important function of the lens being the alteration of focus. On the other hand, in aquatic forms, such as fish, no corneal convergence, or almost none, is present, the media—namely, sea water, or even fresh water—being of practically the same density as the media of the eye itself. In these forms convergence must, therefore, be brought about by the lens only, and for that purpose a spherical lens is present.

The physiology of accommodation in birds is remarkably complicated, differing in many respects from that found in the mammals. In the latter—or, to be more correct, in the terrestrial forms—alteration of focus is brought about by alteration in the shape of the lens. This structure, when focussed for near objects, becomes more convex, particularly on the anterior surface. There is no change in shape of the transparent front part of the eye. In birds, on the other hand, with the exception of some of the night fliers, though like in man and other animals, the eye is normally focussed for distance, accommodation is a more complex process, there being change in shape both of the lens itself and of the eyeball as a whole. It further differs in that it is a positive process, relaxation of the muscle focussing the eye for nearer points.

In birds there are found two main types of eyes, though intermediate forms exist—namely, the tubular eye, with rounded lens, which allows for a normal near vision such as in the night-flying birds, and the other, the almost spherical eye with flattened lens, characteristic of high-soaring birds of prey, and consequently adapted for distant vision.

There is little to be said of the iris in birds apart from the fact that the movement of this curtain or diaphragm is voluntary, the pupil widening or closing at will. Apart from the voluntary action, closing of the pupil or a stopping-down process occurs in the presence of strong light, and is, therefore, reflex in nature, widening of the pupil being noticed in weak light and also for distant vision.

The retina—the sensitive plate, as it were, of the eye—consists of a layer of fine nerve endings which in most animals conform to two well-marked types, rods and cones. In birds it has been for a long time thought that this layer consisted of rods only, but closer examination shows that cones are present, though very much reduced in number. There is also a belief existent, with perhaps some reason, that the function of the cones is associated with differentiation of colours, or the formation of visual purple, while rods determine movement, form, and shape. This is the layer which is stimulated by the photo-chemical action of light, the sensitizing substance being found in the external layer of the retina, and called, for convenience, visual purple. It is believed that this substance changes under the effect of light, and the chemical changes effected act on and stimulate the nerve endings,





Australian Barn Owl (*Strix delicatula*).

FROM A PHOTO, BY D. LE SOUEF.

giving rise to the particular sensation. In vertebrates this retina is not without its drawbacks. There is a well-marked blind spot where the optic nerve branches out into its numerous endings, this area being particularly large where the pecten is well developed. Further, many blood-vessels ramify over the surface of the retina, and here, also, light is prevented from falling on and being registered by the sensitive layer.

It is well known that in man there is a central small area where sight is keenest. This is called the *fovea centralis*, and here only rods are present. In birds it is believed that there are two such areas in each eye, one on either side of the pecten. It may be stated here that the pecten is a pigmented, vascular structure lying in the posterior chamber of the eye, protruding forward from the papilla of the optic nerve (Plate XXXIII., fig. 2). The size varies considerably in different species, extending in some almost to the posterior surface of the lens, while in others it is small and inconspicuous. It is absent in one bird—namely, the *Apteryx*—and is practically absent in the Nankeen Night-Heron (*Nycticorax caledonicus*). The function of the pecten has always been a matter of controversy. There seem to be no special habits or conditions in birds possessing this structure of equal size and shape, while birds with similar habits show great variations. One theory was that it was protective, guarding the retina from the action of excessive light—in other words, a light-filter. Its structure being vascular suggests some functions associated with the tension or nutrition of the eyeball. In accommodation for near objects it has been found that there is, with the passage backwards of the posterior surface of the cornea, the transference of fluid from the anterior chamber. This is shown by injecting methylene blue into the anterior chamber and stimulating the nerves of accommodation, then noting the course of the fluid.

Admitting, then, that there is a transference of fluid from one chamber to another to maintain an unvarying intraocular pressure, some governor must be present to effect this quick interchange, and it is believed that the pecten acts in this way. In support of this theory, it can be shown that in high-flying birds, birds of rapid flight, birds of prey, where the eyes have to be accommodated to extremely rapid alteration of focus, the pecten is well developed. It is, on the other hand, comparatively small in nocturnal birds. Against this theory, it may be stated that reptiles, or some reptiles, possess a pecten, and in these animals the above conditions hardly exist. The important point is, that the presence of this large pecten creates a large blind area in the eye, and, as it is heavily pigmented, all light falling on it is naturally absorbed. It explains to some extent the constant shifting of the head when a bird is on the watch, as the visual field is considerably limited, the portion obstructed being towards the upper outer field of vision. Before leaving the retina, it should be mentioned that the presence of oil globules in this layer has been known for a long time. These globules are coloured red and yellow, and are found

only in birds. They appear to exert no effect on colour vision, as they are in no way identical in composition with the visual purple or sensitizing substance.

The numerous fibres from the endings of the rods and cones collect to form the optic nerves. The nerve from each eye converges and meets at what is known as the optic chiasma, where they unite and again separate. In all animals where binocular vision takes place, or, to be more correct, where there is total binocular vision, there is partial decussation of the fibre. Those fibres leading from the right half of the right eye pass to the right side of the brain, while the fibres from the left side of the right eye cross over at the chiasma to the left side of the brain.

The amount of decussation varies accordingly with the power of binocular vision. In some animals where partial binocular vision is possible, though not usual, as in the horse and some rodents, only a few fibres do not decussate. In animals incapable of any binocular vision complete decussation takes place. This latter condition is found in birds, or nearly all birds, the fibres entirely crossing over at the chiasma. One must first get a grasp of the true meaning of binocular vision to appreciate the difference between pure binocular vision and seeing the same object with both eyes. If we hold a piece of paper between the eyes so as to view, say, a red area with the right eye and a yellow area with the left, we do not see the two separate coloured spots, but a spot of the colour equalling the blending of the pigments; this is due to a superimposing of the images registered. In animals and birds where the axes of the eyes are not parallel, it means that the image of an object falling on the right half of the right eye falls on the left half of the left eye. Only in animals where the axes of the eyes are parallel do the images fall on the same half of each eye, notably in human beings and monkeys, thus making possible true binocular vision. In other words, in birds (with the possible exception of some of the birds of prey and some nocturnal birds) the sight or visual field consists of two separate views not capable of being superimposed and not stereoscopic in effect.

The advantage of observing the same object with both eyes is, that it permits of greater concentration once an object or victim has been perceived, and it is thus found in Eagles, Hawks, &c., where acuity and concentration are so necessary for their existence. In man the stereoscopic vision gives him the judgment of distance, and it is chiefly by this, and to a smaller extent by accommodation, that distance is accurately estimated. On the other hand, birds, or most birds, have to depend upon accommodation for their judgment of distance, possibly by the focussing movement of the lens brought about by the action of Crampton's muscle, the pull being so strong in some species that a ring of bony laminae is provided in the sclerotic coat, near the corneal margin, to prevent alteration in shape of that part of the eye.

Monocular vision has a great advantage of giving a far more extensive scope of vision. It is a valuable asset for the birds

which must maintain a constant look-out for the approach of danger, and for that reason it is found mainly in those birds of poor defence, whose safety lies in speedy detection and evasion of their enemies. In these birds there is the range of two extensive visual fields, each being equally recorded and scrutinized. The moment an object of interest is detected the bird does not direct both eyes towards it, but there is a concentration of one eye, the vision of the other being suppressed at will. In some diseases of man, where the axis of one eye has departed from the parallel of the other, each eye sees a field which does not correspond with the other, yet diplopia or double vision is not present, as the one



Plain Wanderer.

FROM A PHOTO. BY D. LE SOUEF.

or the other field of vision is suppressed according to the automatic concentration in one or the other eye. Note a group of Pheasants or Pigeons watching the same object; one eye only will be directed towards the position. Watch a Fowl or a Pigeon gazing upward at a Hawk; one eye will be skyward, the other toward the ground. In such cases the vision of the downward eye is being suppressed. If suppression were not possible in birds, a position similar to diplopia would be present. An idea of this condition can be gained by pressing one's eye, thus shifting the visual axis of one eye, when a double image is obtained. In the human it is possible to suppress the vision by exercise and education, otherwise the eye

must be closed—thus, in shooting or looking down a microscope ; but by a continual effort at concentration it is possible to keep both eyes open and to suppress the vision of one.

When we come to acuity of vision in birds, one must immediately recognize a superiority over the rest of the animal kingdom. There is no doubt that they possess an acuity almost immeasurable compared with our own standard. Normal sight in man gives an acuity of about one minute in degrees of the circle, which means that at six metres we can distinguish clearly enough to identify letters in lines one centimetre in width. Man and monkeys are perhaps in advance of the rest of the mammals, but fall extremely short of the standard found in birds. Speaking roughly, it is justifiable to say that birds possess about a hundred times the degree of acuity found in man. Visual acuity for moving objects is much more keen. This probably accounts for the habit of small animals or birds wishing to escape detection becoming immobile, their protective colouring blending with the surroundings.

Peep through the smallest hole in a fowl-yard fence, and one will find that some old hen has perceived the action. An instance of the remarkable visual acuity can be seen in the Vulture and its habits. On the death of an animal there may not be a Vulture in sight, and in a few hours' time many will have arrived at the feast. These birds become aware of a dead beast, not by smell (as that sense is vestigial), but by sight. Vultures are extremely high fliers, only one bird out-soaring them—namely, the Adjutant. It is probable that the nearest Vulture sights the animal, and descends to the carcass. The bird's action is observed by the Vulture further away, which is likewise led to the scene, and so it goes on. In this way it is believed that birds come from a distance of from 50 to 100 miles by their observation of each other's action. A fact pointing to their ability to locate a carcass was observed in one of the outbreaks of rinderpest in Natal. It was found that if a carcass were covered by branches immediately after death, so as to obscure it from the sight of the birds, it was never disturbed by Vultures.

Though there is no means of measuring accurately the visual acuity of birds, a fair idea may be obtained by observation of their habits. A Great Brown Kingfisher (*Dacelo gigas*), from a position on a post where it can inspect newly-ploughed land, seems to have no difficulty in locating the exposed part of a worm from any distance up to 100 yards. Watch an old hen in charge of a few chicks, and nothing overhead, be it ever so small, will escape her notice.

Acuity for stationary objects, though not so finely sensitive as for those moving, is still remarkable. Experiments have been made with Pigeons, feeding them on a board on wheat, among which a percentage of the grains have been stuck by adhesive substance. One mistake is sufficient to prevent them again making the error, small, slight alteration from the natural position



Nankeen Kestrel.



of the grain giving them the clue. Many similar cases could be quoted. The vision of nocturnal birds is enhanced by the size of the eyeball itself, and the convexity of the cornea, which collects more light from an object than that with less convexity. They present, too, the markedly tubular eye. The pupil in these birds is capable of great dilatation. The poor vision of these birds in the daytime is accounted for by the fact that the eye is normally focussed for objects comparatively near, and, again, because of the amount of stooping down necessary to exclude the strong light. The eyes of these birds are probably what are known as dark-adapted eyes, and the attempt to see in bright sunlight has an effect similar to that which we experience on emerging from a dark room into the sunlight. This is not due so much to the contraction of the pupil as to arrangement of the protective pigment around the endings of the optic nerve.

The power of individual movement of the eyes is greater in birds than in man, extensive divergent movement being possible, while convergent movement is seen as in the human being. But, in spite of this, the amount present is not sufficient for the needs of the bird, which nearly always moves the head to shift the direction of gaze.

Of the accessory structures of the eye not much need be said. The eyelids present little differing from mammals, with the exception of the absence of eyelashes and the greater mobility of the lower lid. The third eyelid, known as the nictitating membrane, is well developed in birds, constantly sweeping the surface of the cornea and keeping it free of small particles and so forth. In mammals it is not moved voluntarily, but by pressure exerted by the backward movement of the eye itself. This membrane in birds is moved by two voluntary muscles, which bring it across the eye with lightning-like rapidity. In aquatic birds it invests the eye while submerged, and is then transparent, to allow vision without endangering the sensitive surface of the globe.

We come now to a more interesting, though more difficult problem—that of colour vision. If one accepts the Young-Helmholtz theory, it must be taken that white light consists of the combination of three primary colours—namely, red, green, and violet. Later works seem to incline towards the older division according to Newton—that the primary colours included red, orange, yellow, green, blue, indigo, and violet. In other words, the blue and yellow have as much right to be considered as primary colours as the other three. The existence of colour vision in animals is, of course, very difficult to determine. It appears, however, that with trained dogs and horses there is no difficulty at all in teaching them to distinguish between the saturated colours. The preference of some birds, notably the Bower-Birds, for objects of a certain colour, and the general evolution of colour in the different species, must point to an appreciation of different shades. Colour sensation must be

appreciated by the stimulation of waves of varying lengths. In man it varies from about 770  $\mu$ . to 396  $\mu$ ., the latter being the extreme of light registered at the violet end of the spectrum.

It would appear, if we adopt the Young-Helmholtz theory, that man has a trichromatic vision, and that all the shades appreciated are due to the degree in which the three classes of nerve fibres are stimulated. Yellow, for example, is caused by an equal stimulation of the sets of fibres for the red and green percipients. When red is seen, the fibres percipient of red are strongly stimulated, the others only weakly. Colour-blindness is an interesting side study in this respect, particularly when we come to the colour vision of birds. In man dichromatic vision appears most commonly with a blindness for red or green, the violet blind being rare. In red or green blindness, the subject confuses reds and greens, and in a mixture of colours including these, colours other than red or green are the only ones appreciated.

Now, it has been shown by feeding experiments that birds are blind in the violet end of the spectrum. In other words, if we accept the Young-Helmholtz theory they have a dichromatic vision. Their colour vision would be restricted to red and green and the mixtures of these colours. They would be blind to violet and to the spectral violet in blue, indigo, and yellow. Such a conclusion would be disastrous to our theory of selection in the coloration of birds, where many blues and shades of blue are seen. It would mean that the development of colour in the evolution of the present-day bird was merely incidental, and apparently without reason. The flaw in the reasoning probably lies in our acceptance of the Young-Helmholtz theory instead of recognizing the other colours as primary. Again, the conclusion obtained from the feeding experiments may be faulty. The birds are fed in spectral red light and in spectral green, where they pick up the grains readily; but, when taken to spectral violet, remain still, fail to see the grains, and are to all intents and purposes in darkness.

A man colour-blind in red or in green, though not seeing these colours as a normal person would see them, still sees the objects, but is blind to the colour only. His vision extends right to the red end of the spectrum, though not recognizing the red there, so that the waves stimulate the eye, though not giving the colour sense. It is probable that in birds the sight is keyed to a higher pitch than in man, and that the retina is not stimulated by wave lengths as short as that of the violet, while yet possessing the whole of the range of colours as far as the violet. In man we know that the eye is blind beyond the two limits of red and violet, but we are able to ascertain the presence of ultra red and ultra violet rays that the retina does not register.

There is still a great field for investigation into the function of sight. So far, the work done is mainly comparative, and must be based on the lines found existent in the human subject, where the subjective assistance is of great value. But of the conditions





Crested Pigeon.

in birds we can only theorize, while there may be present conditions outside our comprehension of the powers of the eye. There is still much to be learned concerning accommodation, monocular vision, colour vision, and the function of the pecten.

#### EXPLANATION OF PLATES.

##### PLATE XXXIII.

Fig. 1.—Globes of the eye of Horned Owl. Skull dissected away to show comparative size of eyes to the brain. Cornea removed from right eye. Specimen shows the tubular eye of near-sighted night birds, the eyes capable of forward vision, both seeing practically the same field of vision.

Fig. 2.—Eye of Emu dissected to show anterior and posterior chamber of globe, showing well-developed pecten, almost spherical eye, flattened lens. Type of eye normally focussed for distance.

##### PLATE XXXIV.

Delicate Owl, showing eyes capable of forward double vision.

##### PLATE XXXV.

Nankeen Kestrel, showing eyes capable of seeing a single object with both eyes, though total visual fields varying greatly.

##### PLATE XXXVI.

Crested Pigeon. Vision totally monocular, both visual fields differing, either field capable of suppression in concentration of the other eye on a single object.

#### ILLUSTRATION IN TEXT.

Plain Wanderer. Type of total monocular vision. Both visual fields distinct.

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## Eggs of Reptiles and Birds Compared, with Some Unusual Examples of the Latter.

BY DR. R. W. SHUFELDT, C.M.Z.S., WASHINGTON, D.C.

INASMUCH as reptilian characters of one kind or another are constantly being found to exist in birds—a few here and more there—it is not at all surprising that, when we come to study extensive series of birds' eggs, laid by species representing avi-faunæ of widely-separated regions of the world, we meet with those of some species which, in one way or another, exhibit reptilian characters. Such discoveries furnish additional evidence establishing the fact that these two groups in nature arose from some common, pristine stock, while their differentiation at present is very thorough and complete. This last is becoming more and more so as certain species are entirely exterminated through man's agency—that is, many birds, exhibiting in their economies an unusual number of characters indicating the reptilian origin

of the class as a whole, are thus being destroyed. For instance, the Moas are all gone, the *Apteryx* will soon follow, while similar examples are to be found in many other parts of the world.

It is very certain that, for several million years past, birds of one species or another have laid eggs similar in all respects to those laid by certain species of existing avifauna in various regions of the earth; they have had the same forms—ellipsoidal, broadly ellipsoidal, spherical, ovate, broadly ovate, and so on. Recently, I have presented a paper on "Fossil Birds' Eggs," in which all this is touched upon; and in fig. 1, Plate XXXVII., will be seen an *ellipsoidal* egg of a bird that thrived during the Oligocene of France, it being a specimen at this time in the collection of the U.S. National Museum. There were also birds during the Oligocene period, that laid eggs of an *ovate* form, just as many species do to-day; but whether these eggs were all white, or exhibited markings of any kind, we have, at this time, no means of knowing. Their contents were doubtless the same, and the *shell structure* was certainly the same—a fact proved in my forthcoming paper on fossil birds' eggs by the figures of microscopical sections, the latter compared with similar sections of an egg-shell of an existing bird.

Whether any birds—ancient or modern—ever laid eggs wherein the shells were more or less soft and flexible, such as those deposited by certain existing marine turtles, I am, at this time, unable to say. By birds is meant here such vertebrates as, at any time, possessed true *feathers*, irrespective as to whether the forms having them could fly or not. Some reptiles lay but a few eggs each season, while others deposit a large number at one time, as, for example, the marine turtle *Caretta imbricata*, which has been known to lay as many as two hundred and fifty to a clutch. It is impossible now to ascertain data on this point with respect to birds of former ages, as, for instance, those birds that existed during the Oligocene or the Jurassic periods of geologic time. Modern birds vary remarkably in this particular, some species laying but a single egg to the "set," while others may lay as many as a score or more. It is an interesting fact that in some species the females all deposit their eggs in the same nest, which is the case with the Ostrich.\*

Birds, as is well known, deposit their eggs in a great variety of places, as in all manner of nests of their own construction; in the nests of other birds; in burrows; in mounds; on the bare ground, sand, or rocks; in hollows of tree-trunks, made by themselves, or those already a part of the tree, and so on through other habits. In these respects avian nidification has, in time, in many instances, passed through a truly wonderful evolution; but we are familiar with it only in so far as it is manifested in the existing forms of birds, or, rather, those of the world's existing avifauna wherein such habits thus far have come to be known to science.

\* Newton, Alfred, "A Dictionary of Birds," p. 664.



*fig. 1.*



*fig. 2.*



*fig. 3.*



The places selected by existing reptiles of all kinds wherein to deposit their eggs are not nearly as well known as in the case of birds; still, we are more or less familiar with their habits in this respect in the case of many species. Often they are deposited on the bare ground, and not in any way concealed or covered over. Some dig down into the earth, depositing their eggs in the excavation thus made, and then cover them over with the loose dirt and other *débris* thrown out, as in the case of the crocodiles. In certain American species, however, as in the alligator, another method is resorted to, for it forms a hillock by itself, and thus it hollows out, filling the excavation with dead and decaying vegetable matter, including leaves. In this the eggs are hatched out by the sun and the heat generated through the decomposition of the aforesaid vegetable matter. This habit must not be contrasted with the nidification of certain of the *Megapodiidæ* as evidence that the latter occupy a low position in the system among birds; although, as an interesting fact, it would at first appear to be so, especially as the *Crocodylia*—as in the case of many other reptiles—lay perfectly ellipsoidal eggs, as do some of the *Megapodes* likewise (fig. 3, Plate XXXVII.) Here, however, the *form* of the egg most assuredly may point to the common origin of the two great groups in question—*Aves* and *Reptilia*; whereas the *method* of nidification would not, as I say, point to the fact that birds practising it were of a low order of organization, or that they would, in other words, present an unusual number of reptilian characters in their morphology, which, as we well know, is not the case with the *Megapodiidæ*.

Apart from this, it is fair to presume that the appearance of spherical and ellipsoidal eggs among birds is, upon the other hand, another link in the evidence of the proof that *Aves* and *Reptilia* had a common origin in time. This fact has also been touched upon by Heilmann in his recent studies of the subject.\*

As is well known, some birds lay more or less spherical eggs, and of this class the Owls are a good example. Indeed, one of the *roundest* eggs I ever examined was laid by a Barred Owl (*Strix v. varia*), collected by Mr. Edward J. Court, but at this writing in the Museum of Natural History at Los Angeles, California. Mr. Court generously presented this specimen to Mr. A. B. Howell, of Covina, California, and from him, I believe, it passed to the above-named museum. While it was in Mr. Court's possession I made a negative of it, and a photograph from that is here reproduced in fig. 2 of Plate XXXVII.; it is natural size, and comes extremely close to being a perfect sphere.

\* Heilmann, Gerhard, "Vor Nuværende Viden om Fuglenes Afstamning." *Dansk Ornithologisk Forenings Tidsskrift*, 9de Aargang, Hæfte 1, Copenhagen, Okt., 1914, pp. 12, 13. This admirable work, now appearing in parts, on "Our Present Knowledge of the Origin of Birds," is of the greatest value; and it is my intention, when all the parts are out, to do it in English. Part iv. has already appeared, and the work will probably be completed by the summer of 1916.

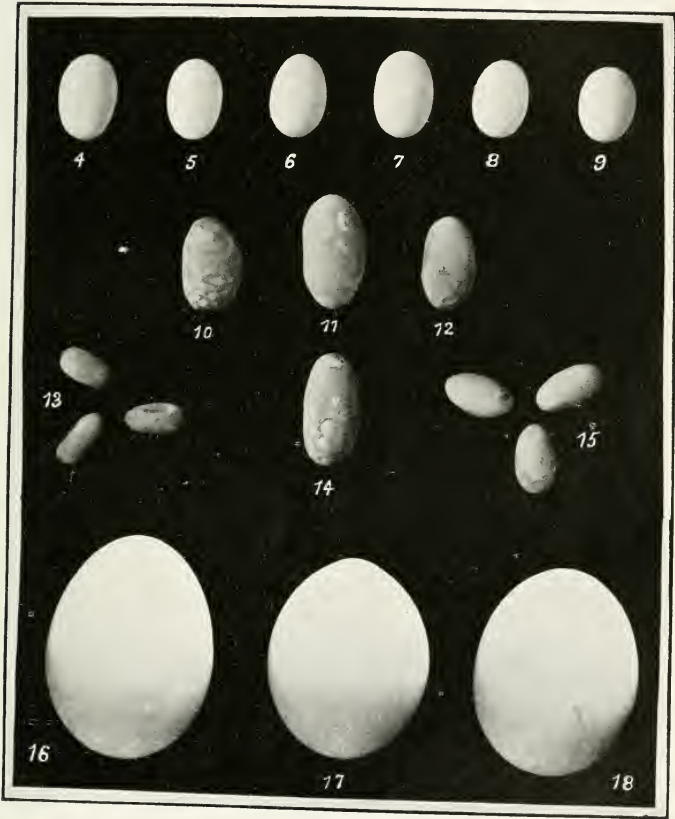
Ellipsoidal birds' eggs are far more frequently met with, and, in addition to the one of a Megapode already alluded to (fig. 3), I present on the other plates a series from the *Trochili* (figs. 4-9. Plate XXXVIII.); one of a Cockatoo (*Cacatua roseicapilla*) (Plate XXXVIII., fig. 18); and those of the common Night-Hawk of the eastern section of the United States (*Chordeiles virginianus*) (Plate XXXIX., figs. 23 and 24); also those of the Owlet-Nightjar of Australia (*Egotheles nova-hollandiae*) (Plate XXXIX., figs. 25 and 26).

I have also photographed the ellipsoidal eggs of the *Guira guira*, of South America, a cuculine species that lays a most remarkable egg of a pale blue, with a raised network of white covering the external surface of the shell all over. Mr. Heilmann published one of my photographs of the *Guira* in the work cited in a former paragraph.

The ellipsoidal eggs of birds are not always plain white, then; for we meet with many exceptions to this, not only in the *Guira* just mentioned—and a good example of this—but the two Night-Hawks' eggs on Plate XXXIX. (figs. 23 and 24) are interesting specimens illustrating the same point. However, did we but know of all the ellipsoidal eggs that existing birds lay, I am of the opinion that we would find the vast majority of them without any markings whatever—that is, we would find them to be pure white, like the egg of the turtle seen in fig. 22.

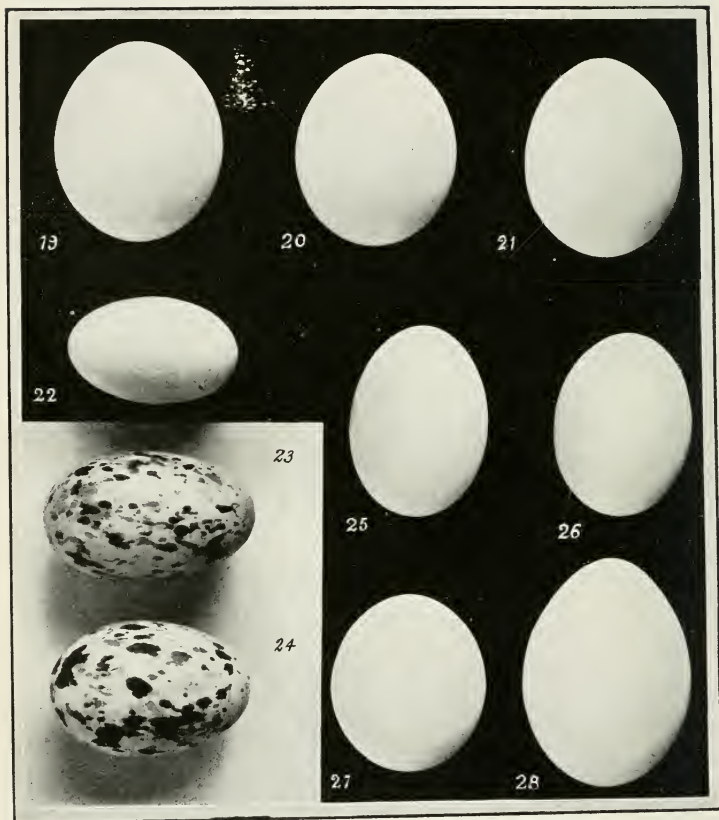
Another interesting feature occasionally to be met with among the eggs of birds is where the egg of one species will closely resemble the egg of another form belonging to an entirely different and distantly related group of birds. Mr. Court has several good examples of this in his collection, and one of these I have selected to illustrate this point. A very beautiful example is seen in figs. 20 and 21—the first being an egg of the Burrowing Owl and the second an egg of the Belted Kingfisher. This comparison is made the more remarkable when we come to compare two other eggs of the Burrowing Owl—of the same clutch—which very markedly differ not only in *form* but in *size*. These eggs are shown on the same plate for comparison (figs. 27 and 28). In fact, the comparison of the Kingfisher's and Owl's eggs on Plate XXXIX. of this article, shown in figs. 19-21 and 27 and 28, is an object lesson in oology to which attention is but rarely invited in books.

Passing from the questions of the *form* and *size* of eggs, as they throw any light on the affinities of birds and reptiles, or upon other matters within the former group, it will be as well to add a few words upon other characteristics of birds' eggs, which, as a rule, stand among the most beautiful objects in all nature. One of the most remarkable instances I have ever met with in the coloration of birds' eggs is exemplified in a set of three eggs of the Least Tern (*Sterna antillarum*) in the collection of Mr. Court. (Plates XL. and XLI., figs. 29-31, 39-41. Here 29 and 39 are the same egg; so, too, are 30 and 40, and 31 and 41. In photo-









graphing them I simply turned each egg completely over in order to get the appearance of the other side.) These eggs are not glossy, being of an extremely pale cream colour; the markings are a very dark, rich, Vandyke brown, interspersed with a few blotches and smaller spots and specks of pale grey. The former are chiefly near the butt, while the big brown blotches are situated, in two instances, toward the big end (figs. 20, 31), and between the two extremities in another (fig. 30).

This pigmentation shows no smearing whatever, and in numerous instances the brown spots and blotches overlie the grey ones, indicating that, as the egg rested at two different points in its descent down the oviduct, the brown markings were the last to be deposited upon its shell; this, however, will not account for the unusually big blotches of brown being only upon one side of the egg. And while two of these eggs may have descended the oviduct butt first—the heavy pigmentation being at that end—it is not at all clear that the one shown in fig. 30 did, for there the great, *square*, unsmearred spot is directly on the side of the shell.

Again, where the markings are as heavy as these, the egg must have made quite a pause in its descent, at some point opposite the pigment glands, in order to have these heavy markings set; or else that peculiar pigment of the seven varieties known may possess the property of setting with great rapidity. Some eggs of other species of birds, however, exhibiting markings of many shades and tints of brown, often have the edges of those markings smudged or blurred, which is good evidence that the egg started again down the oviduct *before* the colouring matter had an opportunity to set.

Long ago Sorby analyzed these pigments by means of the spectroscope, and he named seven or eight of them; but whether any further discoveries have been made of late in that direction, I am not, at this moment, able to say. (P.Z.S., 1875, pp. 351-365.)

After Mr. Bartlett's actual experiments at the Zoological Gardens of London, a number of years ago, no doubt seems to be left in the minds of naturalists but that the big end of a bird's egg—when that egg was of an ovate form—faced posteriorly in the descent down the oviduct. That there are numerous exceptions to this rule, however, there is no manner of doubt. It is best proven by the eggs in certain small *Falconidæ*, where a band of spots or other markings surrounds the egg not far from the apical end of it—sometimes even overlying that point.

The markings on the eggs of some of the *Icteridæ* cannot, to my mind, be explained so easily; and it is still more difficult of explanation in such an egg as is laid by the Regent Bower-Bird (*Sericulus melinus*) of Australia (fig. 33, Plate XL., which compare with figs. 32, 34, 36, and 38 of the same plate). Newton, in his "Dictionary of Birds," says:—"In addition to what has been said above as to the deposition of colour in circular spots indicating a pause in the progress of the egg through one part of the oviduct, it may be observed that the cessation of motion at that time is

equally shown by the clearly-defined hair-lines or vermiculations seen in many eggs, and in none more commonly met with than in those of most Buntings (*Emberizide*). Such markings must not only have been deposited while the egg was at rest, but it must have remained motionless until the pigment was completely set, or blurred instead of sharp edges would have been the result" (Art. *Eggs*, p. 186).

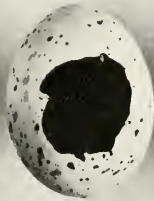
If an egg be "at rest" in the oviduct during the course of its descent, and at a point where the pigmentary glands open into that passage, I can understand that, when they discharge their pigment on to the shell of the egg—the latter being stationary—spots and blotches of various sizes, *with sharp edges*, would be produced; but just how such a gland could produce the *fine*, scraggly, hair-like markings in such eggs as are here shown in figs. 32-36 and fig. 38 it is not easy to imagine. To make such markings as those, the egg must have been stationary, while the *wall of the oviduct*, containing the pigment glands, must have moved and contracted in various ways and directions while the pigment was being delivered, in *very small quantities*, but in *full strength*. In other words, were we to attempt to make such markings on the shell with a pen (a fountain pen, for example, charged with pigment), it must be clear that, in order to depict such line-markings, the egg must either rotate to and fro about its longitudinal or other axes, the pen-point being held in contact with the shell, or else the egg must be fixed and stationary while the hand holding the pen does the work by tracing on the shell the various irregular lines and markings as we see them in the figures on the plate. In other words, it would seem that the contraction of the oviduct during the passage of an egg, particularly when the latter passes the part of the canal where the pigmentary glands are in operation, is both peristaltic and anti-peristaltic, with an action sometimes combining both of these movements. It is difficult for me to see how the tracings laid on the shell of the egg of the Regent Bower-Bird (*Sericulus melinus*) could have been accomplished in any other way.

In such eggs as the Lesser White-backed Magpie (*Gymnorhina hypoleuca*) sometimes lays (see Plate XL., fig. 37), which have a ground colour of a rather light olive-green, and where the pale, rusty, hair-line markings are extremely fine, dense, and equally distributed over the entire shell, the deposition of these latter is more difficult of explanation. The markings in question exhibit some blurring, which is decidedly the case with the faint, diffuse, and not large blotches, of various sizes, scattered over the surface of the shell, with no special congregation at the apex or butt.

There is but one way known to me through which an exact explanation of how markings of this character were deposited upon the shell can be obtained: by securing a sufficient number of recently-shot females, in which the eggs were in the course of passing through the oviducts. In such specimens, careful gross and microscopical examination of all the structures concerned—



*fig. 29*



*fig. 30*



*fig. 31*



*fig. 32*



*fig. 33*



*fig. 34*



*fig. 36*



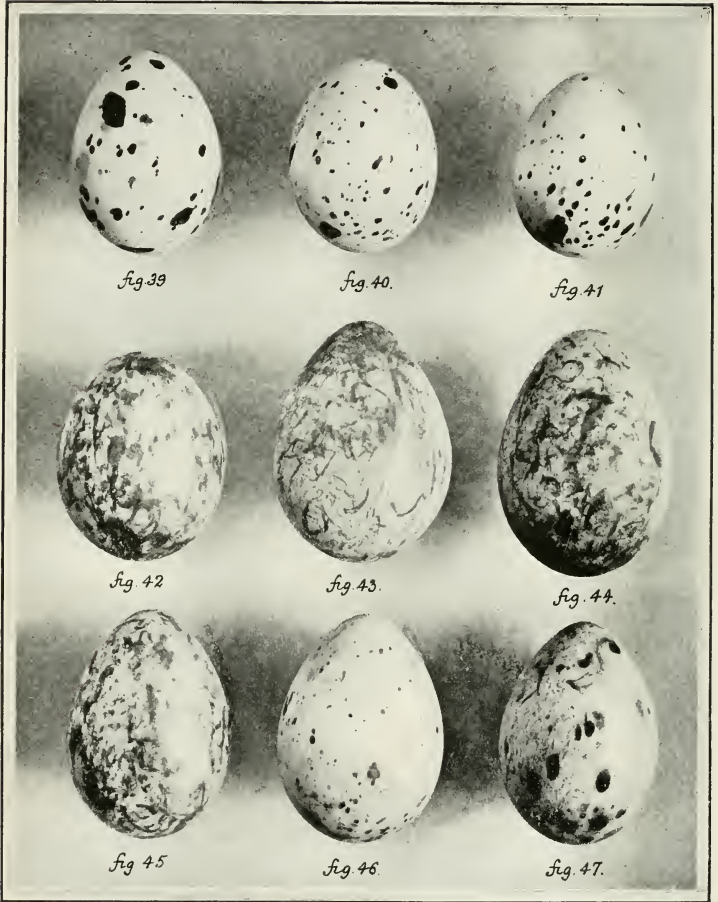
*fig. 37*



*fig. 38*







*fig. 39*

*fig. 40.*

*fig. 41*

*fig. 42*

*fig. 43.*

*fig. 44.*

*fig. 45*

*fig. 46.*

*fig. 47.*

the shell of the eggs in various parts of the canal, and the histology of the walls of the oviduct and the pigmentary glands—should throw a very considerable amount of light on the question.

Sometimes the same species of bird will lay eggs that vary in many particulars, as in form, size, colour, and markings. No bird exemplifies this better than the Australian Black-backed Magpie (*Gymnorhina tibicen*). A number of eggs of this bird are here figured on Plate XLI. (figs. 42-47), and several of these are like the corresponding ones on the coloured plate illustrating the beautiful article by Mr. A. F. Basset Hull, R.A.O.U., published in *The Emu*.\*

Fig. 42 of Plate XLI. of the present article has a ground colour of a somewhat pale greenish-slate, while the lines, blotches, dashes, and other markings all over it are of a bright rufous brown or rusty red; besides these, there are some spots and dabs of a dull lilac. As all of these eggs are given natural size, and can therefore be easily measured on the plate, I have omitted giving their sizes and forms. Fig. 45 closely resembles fig. 42 in the matter of ground colour and markings, but departs from it in form, it being a typically ovate egg. Entirely different from these last two are the eggs shown in figs. 43 and 44, these having a ground colour of a rather light bluish-green, with the markings as shown of a rather pale hair-brown. Except in form, these are like egg No. 5 in Mr. Hull's plate, while 42 and 45 more closely resemble his No. 3, though the markings in the former are more diffuse.

Fig. 46 of Plate XLI. has a ground colour of a very pale pinkish-cream, with the much-scattered little specks and spots quite sharp, and in most instances with sharp, clean-cut edges. They are of a rusty red as well as of a slaty lilac, being considerably massed at the butt and widely scattered over the rest of the egg. Mr. Hull does not figure a specimen exactly like this one, though his No. 6 approaches it in a way. It is, however, a much darker egg and differently marked, the spots being much less numerous and darker.

Finally, Mr. Hull does not figure an egg of this Magpie at all like the one here shown in fig. 47, which likewise has a pale pinkish-cream ground colour, with the markings of a rusty-red and slaty-violet. These consist of large and small isolated and blurred spots, which tend to congregate at the butt, though only upon one side of the egg. This specimen is likewise marked all over with faint hair-line tracings of a bright rusty-red colour, which are very evenly distributed, and greatly conduce to its beauty. Now, in these eggs of the Australian Magpie we have both hair-line markings and spots on the same specimens; some of these may be sharp and others blurred, while there may likewise be massing of the different markings at the butt on the same egg. These may all be explained through what I have attempted to set forth in previous paragraphs of this article, as any egg

\* *Emu*, vol. xiii., pp. 15, 16, Plate V.

passing down the oviduct (either butt or apex first) may sometimes be *at rest*; sometimes—either slowly or rapidly—advance without rotation, or various rotary movements may be imparted to it through the peristaltic and anti-peristaltic contractions of the walls of the oviduct—the pigmentary glands being functionally active all the time in those cases where pigment is being deposited.

Within the past year or so I have published a number of illustrated articles on oology, including eggs laid by birds of this country as well as others from Australia and other parts of the world. Some of these papers have appeared in *The Emu*, *The Condor*, *The Blue-Bird*, and elsewhere.\* As a matter of fact, a great many monographic and other works, some of which are superbly illustrated with hundreds of coloured figures, have already been devoted to this science by oologists in many parts of the world. Still, there remains a vast store of facts, together with undescribed specimens of eggs, to be added to the present literature of the subject, which will require the labours of many naturalists, extending over many years to come, to work up into monographs, articles, and other contributions.

#### EXPLANATION OF PLATES.

(Figures all natural size, and reproductions of the author's photographs, made by him direct from the specimens.)

#### PLATE XXXVII.

- Fig. 1.—Fossil egg of a bird of an ellipsoidal form. Collected at St. Gerand de Puy, France, and presented to the United States National Museum by Dr. R. W. Shufeldt. Oligocene. No. 6,496. Viewed upon lateral aspect, and exhibiting in places both shell and concution.
- Fig. 2.—An egg of *Strix v. varia*, remarkable for its nearly perfect sphericity. This specimen was collected by Mr. Edward J. Court, of Washington, D.C., and was for some time in his collection. Subsequently Mr. Court presented it to Mr. A. B. Howell, of Covina, California.
- Fig. 3.—Lateral view of the white, ellipsoidal egg of a Megapode (*Cathetus purpureiturus*). Collection of Edward J. Court, of Washington, D.C. In form and some other respects this egg resembles more or less closely the egg of certain *Crocodylia* among the *Reptilia*.

#### PLATE XXXVIII.

- Figs. 4-9.—White, ellipsoidal eggs of North American Humming-Birds of different species. 4, Ruby-throated Humming-Bird (*Archilochus colubris*); 5, Black-chinned Humming-Bird (*A. alexandri*); 6, Costa's Humming-Bird (*Calypte costae*); 7, Broad-tailed Humming-Bird (*Selasphorus platycercus*); 8, Allen's Humming-Bird (*S. alleni*); and 9, the Calliope Humming-Bird (*Stellula calliope*). Collection of E. J. Court.

\* Shufeldt, R. W., "Comparative Oology of North American Birds," Report of the U.S. National Museum for 1892, pp. 416-493.

- Figs. 10-15.—White, ellipsoidal eggs of some of the smaller species of North American lizards. 10, *Carpophthiops amicus*; 11, *Cnemidophorus sexlineatus*; 12, *Sceloporus undulatus*; 13, three eggs of *Liolopisma laterale*; 14, *Cnemidophorus sexlineatus*; and 15, three eggs of *Anolis carolinensis*. Collection of U.S. National Museum (Dept. of Reptiles).
- Figs. 16-18.—*Cacatua roseicapilla*, exhibiting variations in size and form. Collected by S. Robinson, Hariman Park, Queensland (Fig. 16, set mark 480, set of 4, 7, 9, 10; fig. 17, 480, 2/4, 12, 8, 9; fig. 18, 480, 1/4, 7, 9, 10). Court collection.

## PLATE XXXIX.

- Fig. 19.—Belted Kingfisher (*Ceryle alcyon*).
- Fig. 20.—Burrowing Owl (*Speotyto cunicularia hypogæa*). Oberlin, Decatur County, Kansas. Eggs 7, 5, 18, 11. Guy Love, collector. 64/4-15.
- Fig. 21.—Belted Kingfisher (*Ceryle alcyon*). Same clutch as egg shown in fig. 19. Figs. 19-21 from Court collection.
- Fig. 22.—"Stinkpot" turtle (*Aromochelys odoratus*). Potomac River, near Alexandria, Virginia. Court collection.
- Figs. 23, 24.—Night-Hawk (*Chordeiles virginianus virginianus*). Maryland. Court collection. Compare the form with the turtle's egg shown in fig. 22 of this Plate.
- Figs. 25, 26.—White, ellipsoidal eggs of the Owlet-Nightjar (*Egotheles novæ-hollandiæ*). Captain S. A. White, collector. 10th October, 1900. Murray River. (Three eggs.) Set mark 1/8, Court collection.
- Figs. 27, 28.—Burrowing Owl (*Speotyto cunicularia*). Showing marked variation in form and size. From same set as Fig. 20 of this plate. All these Burrowing Owls' eggs are in the collection of Mr. Edward J. Court.

## PLATE XL.

- Figs. 29-31.—Set of three eggs of Least Tern (*Sterna antillarum*), exhibiting unusual markings. The opposite sides of these eggs are shown in Plate XLI., figs. 39-41, where they are arranged in the same sequence. They were collected by Mr. E. J. Court on the 6th of June, 1914, at Deep Point, St. George's Island, Maryland. (No nest.) One of a colony of 75 pairs, all breeding.
- Fig. 32.—Boat-tailed Grackle (*Megaquiscalus major major*). Collected by Oscar F. Baynard at Orange Lake, Florida, 9th May, 1909. (Eggs, four.) Set mark, 18/4.
- Fig. 33.—Regent Bower-Bird (*Sericulus melinus*). (Eggs in set, two.) Collected by H. R. Elvery (for the H. L. White Collection) on Clarence River, New South Wales, Australia, 7th Jan., 1909. Edward J. Court collection.
- Fig. 34.—Boat-tailed Grackle (*Megaquiscalus major major*). See fig. 32.
- Fig. 35.—Omitted.

- Fig. 36.—Great-tailed Grackle (*Megaquiscalus m. macrourus*). Collected in See County by Eugene Friebele. (5, 30, 95.) Set mark 275. (Eggs, five.) Collection of Edward J. Court.
- Fig. 37.—Lesser White-backed Magpie (*Gymnorhina hypoleuca*) A. W. Swindells, collector, Sandford, Tasmania. (24, 9, 11.) (Eggs, three.) Set mark 3A. Court collection.
- Fig. 38.—Boat-tailed Grackle (*Megaquiscalus m. major*). See figs. 32 and 34 of this plate for data.

## PLATE XLI.

- Figs. 39, 41.—Eggs of Least Tern (*Sterna antillarum*). Same as shown on Plate XL., figs. 29–31, which see for data.
- Figs. 42–47.—Black-backed Magpie (*Gymnorhina tibicen*). S. Robinson, collector. Hariman Park, Queensland, Australia. (Set of four.) Two collected. Marked 230, 4/9/09. (No. 27.) Court collection, Washington, D.C. (Figs. 42 and 45.) Figs. 43 and 44 another set (3, 12, 12). Taken by E. Barnard (figs. 46 and 47). Another set (647, 4/3), 21/9/09. Same locality and collector. All at this writing in the collection of Mr. Edward J. Court, of Washington, D.C., and collected by Mr. Septimus Robinson.

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## Some Tasmanian Birds' Nests.

BY H. STUART DOVE, R.A.O.U., WEST DEVONPORT (TAS.)

BIRDS' nests may, for convenience, be classed under several heads—the *pendile*, swung by the rim of the nest, in which the eggs, and later the nestlings, are rocked by the winds; the *suspended*, in which the structure is held at the sides only, without support from below; the common or *supported* type, in which the nest is placed on a branch or in a fork or niche; and the *ground* nest.

A good example of the *pendile* style of building is the nest of the White-eye (*Zosterops dorsalis*). These smart little birds are familiar to all in gardens and orchards, or among the patches of scrub by the beach, in their greenish and buff colouring, and with their sharp, ringing call-note, as they dash in small companies through the bushes. In New Zealand a common name for this species is "Blight-Bird," on account of its beneficial habit of patrolling the orchards in winter time and picking off the woolly aphids and other pests. The swinging type of nest, such as is built by this bird, is not common in temperate climes, being specially adapted to puzzle those inhabitants of tropical countries, such as monkeys and tree-climbing snakes, which have an irrepressible craving for eggs and nestlings. Except the nest of this species and those of the Strong-billed Honey-eater (*Melithreptus validirostris*) and Black-headed Honey-eater (*M. melanocephalus*), I know of no other in Tasmania whose structure is truly *pendile*—*i.e.*, sewed by the rim to supports, otherwise swinging

clear like a hammock. The Spinebill Honey-eater (*Acanthorhynchus dubius*), however, will occasionally adopt a similar form. In a scrub near Launceston (Tas.) the nest of a pair of these elegant little Honey-eaters was swung by the edge from slender twigs of tea-tree (*Melaleuca*), but there was also a small twig at the back which gave some support, and another ran horizontally beneath.

The two nests of the White-eye here briefly described were found while I was living among the scrubs near Table Cape, North-West Tasmania. (A.) Swung by the rim from a very frail fork of the *Melaleuca* or Swamp Tea-tree, the supports being barely one-sixteenth of an inch in thickness, so that the total weight of nest, young, and parent must be very slight. The opening of the little cup was almost elliptical in form, the measurement of the egg cavity,  $2\frac{1}{2}$  inches by  $1\frac{1}{2}$  inches, 2 inches deep, swelling out under the rim like an inflated ladle, and with rounded bottom. The material was very fine shreds of stringybark from the eucalypt of that name (*E. obliqua*, L'Her.), with somewhat thicker strips underneath, the rim being sewed to the twigs by threads of bark fibre and spider-web; a few spider-cocoons were stuck on the outside of the nest, and the lining was of horsehair. The contents were three eggs, of a delicate blue tint. (B.) Bound to two very slender *Melaleuca* twigs in the same way as (A), the ends of the twigs swinging quite freely; nest rounder at top and more open, not so deep; measured  $2\frac{1}{4}$  inches by 2 inches across top outside,  $1\frac{1}{2}$  inches inside; formed of coarse, dry grass, lined with fine grass, a little green moss worked in, and many white spider-cocoons stuck on outside; bound to twigs with grass-blades and spider-web. A very loose structure, not nearly so neat as the bark cradle; but both were so frail that they could be seen through at almost any part. Neither had the slightest sign of any support other than the very frail horizontal swinging twigs.

A beautiful example of the pensile type of nest was found while Mr. H. C. Thompson and myself were exploring the slopes of Mount Arthur, in North-East Tasmania. There, in the head of a dogwood tree (*Pomaderris apetala*, Lab.), 30 feet from the ground, was found the nest of a pair of Strong-billed Honey-eaters (*M. validirostris*), a species peculiar to Tasmania and its adjacent islands. The nest was hanging from dogwood twigs, to which it was bound by fine strips of stringybark. It was formed entirely of the same bark, and lined with soft brown material from the crown of the *Dicksonia* tree-fern, which grows in those forests. The nest contained three beautiful eggs of a pinkish tint, spotted with dark red, mostly at the larger end. The ground colour of one egg was much browner than that of the others. Curiously enough, a pair of the shade-loving Pink-breasted Robins (*Erythrodryas rhodinogaster*) had built in a fork of the same tree, 13 feet from the ground, a very beautiful home of green moss, covered on the outside with grey lichens.

The other pensile nest-builder, called the Black-headed Honey-eater, also peculiar to our island and adjacent islets, generally

uses wool as material, with some moss and spider-cocoons; they may line with fur or with feathers. The nest is suspended among the pendulous twigs at the extremity of a gum-branch—the white gum (*Eucalyptus viminalis*) being the one usually selected—and is so buffeted by the winds that it is often topsy-turvy, but the brave little mother bird “sits tight,” so that the eggs or young are not thrown out. A nest of this species found in North-West Tasmania by Dr. Holden was composed of green moss and spiders’ web, the lining being of fluffy seeds. The dimensions of one nest were:—Egg cavity—width,  $1\frac{3}{4}$  inches; depth,  $1\frac{3}{4}$  inches; outside dimensions—depth, 4 inches; width, 3 inches. Both this species and the Strong-billed Honey-eater usually lay three eggs to a clutch. The eggs are of a delicate flesh tint, marked (chiefly about the apex) with rich reddish-brown spots; those of the latter are somewhat the larger, about .88 by .66, while an average egg of the Black-headed Honey-eater measures .78 by .57.

Of those structures which are *suspended* among vegetation, one of the best examples is that of the Reed-Warbler (*Acrocephalus australis*), a migrant, which usually comes to us in September. The nest is generally placed in reeds, about two feet above the water, and is bound to three or four stems, which pass through the sides of the structure; the material is stems and leaves of aquatic plants, or coarse grass. The lining is sometimes fine grass, sometimes the soft down from seed-vessels of the “bulrush” or reed-mace. These migrants are plentiful near Launceston, and build in the reeds which line the North Esk River. The railway sheds are close to the river, and the Reed-Warblers which nest in that vicinity avail themselves freely of the cotton-waste used for cleaning engines, quantities of which are strewn about outside the sheds. Mr. H. C. Thompson showed me a nest composed almost entirely of this soft, warm material. When in Victoria I was somewhat surprised to find a nest of the Reed-Warbler at a height of *eight feet* from the ground, bound to two stout upright twigs of the exotic shrub *Sparmannia africana*, Linn., close to the edge of a lake. The nest was formed of grasses and lined with the seed “wool” of the reed-mace (*Typha*). Another nest was found in a clump of bamboo, five feet above the water line, where two smaller shoots forked out from the main stem, and was tied to all three. A third example was four feet above the water, in a bamboo, and was most unsymmetrical, one side being much bulged with a large knot of fine grass which had been teased out and then stuck there. The structure was tied to four small stems, but not to the main one, and contained two young birds, blind, and devoid of down, but with tiny quills just beginning to sprout.

An interesting example of the *supported* nest was that of a pair of Flame-breasted Robins (*Petroica phænicea*), found in the second week of November while I was on the trip to Mount Arthur, mentioned previously in connection with a pensile nest.

The Robins' nursery occupied a niche, about five feet from the earth, in the trunk of a giant gum-tree, and was formed of fine bark strips and lined with small feathers. We admired the manner in which the architects (which were young birds, for the male was grey, like the female) had brought tiny fragments of charcoal from the interior of a burnt-out tree near by, and bound these round the outside of their nest with cobweb. This caused the nest to harmonize with the charred surface at the back of the niche above it, thus making it appear but a portion of the tree-trunk.

In the course of the same trip a nest of the Large-billed Ground-Thrush (*Oreocincla macrorhyncha*) was found, placed upon the top of a large gum-tree stump, at a height of about five feet, and screened by a copse of young dogwoods (*Pomaderris*). It was composed of dry grass and green moss, and contained two eggs. From my journal, kept while living in the bush within a few miles of Table Cape, is culled the following:—"Nest of the Ground-Thrush (*Geocichla*) discovered to-day (10th October) in the fork of a large dogwood (*Pomaderris apetala*, Lab.), about 10 feet up. A large, beautifully-round structure, taking up the whole space within the fork, and composed of green moss and fibres plucked from the trunks of Dicksonia tree-ferns. Within were two fine eggs, of a greenish tint, blotched all over with dark red." This Thrush is fond of the site of an old nest, and will sometimes build on the same foundation season after season until the structure outside becomes of a great size, although the egg cavity itself may be under 3 inches in width and 2 inches in depth; the eggs are usually either two or three in number, rarely four, and an average measurement would be 1.35 inches by .92 inch.

On the occasion of a trip along the banks of Distillery Creek, near Launceston, on 21st October, a nest of the Ground-Thrush was noted in the scrub above our heads, on top of an old home of the ring-tailed possum (*Phalanger*). Upon the mass of sticks which had been brought together in a former season by the marsupial, the Thrush had constructed a large, circular nest of grass, and lined it with soft green grass, but so far no eggs had been deposited. Another nest was found only four feet from the ground, built on dry gum-twigs which had fallen on to a bush; a dirt base had been placed upon the twigs, then a nest of grass with a little moss intermixed, and lined with grass. Where moss is easily obtainable, the Ground-Thrush is fond of using it in profusion, giving a most pleasing appearance to the nest.

While exploring a hill not far from Launceston, a friend and myself found a patch of the scrub sometimes known as Pinkwood (*Beyeria viscosa*, Miq.), belonging to the Euphorbias. Some of the bushes had been killed by a running fire, and when scorched in that way the *Beyeria* has the habit of curling and twisting together at the apex, so as to form a thick mass, much in the same manner as the Jamwood Acacia of Western Australia is described as doing. About 10 feet from the ground, in one of

these twisted shrubs, a pair of Brown-rumped Tit-Warblers (*Acanthiza diemenensis*) had built a domed nest, with side entrance. It was woven of grass and moss, the lining being mainly composed of feathers of the Rosella (*Platycercus eximius*). In another bush of the same kind, near by, was the little cup-like nest of a pair of Fantail Flycatchers (*Rhipidura diemenensis*), known to boys as "Crazy Fans," from their erratic aerial evolutions when capturing insects. The nest, which was about five feet from the ground, was made of small fragments of white decayed wood, very light and delicate, a little moss, and bound, as usual, with spider-web. A small branch of the shrub passed through the bottom of the nest, and on this and around it the structure was placed—the tiny cup above, the irregular tail, about 3 inches in length, below. This peculiar appendage, the use of which can be only guessed at, is also formed by the mainland White-shafted Fantail (*Rhipidura albiscapa*, Gld.), but in our island species, known as the "Dusky Fantail" from its darker tint, it sometimes reaches a great length, nests with a "tail" of 6 inches having been found; I have heard of one even 7 inches in length. The egg cavity is not usually more than  $1\frac{1}{2}$  inches across, and less in depth. It is often lined with the reddish fruiting-stalks of moss. The "Crazy Fan" may sometimes be touched, even stroked, on the nest; perhaps the most confident of our small birds, fluttering about a pedestrian on the bush-track or by the wayside in order to capture the flies, small moths, and so on, which are disturbed.

While pushing through the belt of thick tea-tree (*Leptospermum*) which adorns much of the banks of a large creek in the Launceston district, excluding the sunlight and keeping the ground almost devoid of undergrowth, we noticed one of those fine Honey-eaters formerly called the "New Holland," but now the White-bearded (*Meliornis nova-hollandiae*), upon her nest, about eight feet from the ground, in a fork of the scrub. She hopped to a twig which projected at an angle from the nest, and stayed there, without a note or a movement, for about 12 minutes, until cameras had been erected and pictures taken. As soon as one of the party went close, the female bird left and the male appeared, dashing about and uttering angry cries. The nest was roughly cup-shaped, composed of small twigs and wool, and lined with the soft, downy seed-pods of the "cotton-bush" (*Pimelea nivea*, Lab.), which grows plentifully hereabouts and is commonly used by this Honey-eater. The nest contained two good-sized young birds and an infertile egg. It is interesting to note that this lively and handsome species is partial to a similar nest-lining on the mainland of Australia, for an observer records a case at Upper Werribee, Victoria, where the lining was entirely of soft, yellowish-white seed-casings derived from a particular shrub there.

Towards the end of September I discovered the nest of a Brown Scrub-Wren (*Sericornis humilis*) within a few yards of a public road daily traversed by carts, cyclists, pedestrians, and occasionally by motor-cars. The nest was within 50 yards of the

sea, placed in a tangle of the prickly-leaved *Stellaria pungens*, Bron., and bracken fern, and was shaded by a small varnish wattle (*Acacia verniciiflua*, Cunn.) It was composed of grasses and portions of dry fern, and lined with feathers; placed at a height of  $2\frac{1}{2}$  feet from the ground, and so well concealed in the tangle that only the entrance was visible when one stooped to peer into the thicket. Had the bird not flown as I made a thrust with my stick among the ferns, her secret would probably have remained undiscovered. In the afternoon of the same day I paid another visit, and was rewarded by finding the female upon the nest, where she remained and gazed quietly at me.

To quote a few instances of birds that select the ground for their nurseries, or get so close thereto that they may be considered as ground-builders, I will describe a ramble along the side of a white gum-tree hill in Northern Tasmania. Here, under shelter of the fine, straight, young trees, and amid the profusion of *Lepidosperma* tussocks with which the long slope is covered, numbers of beautiful Yellow-throated Honey-eaters (*Ptilotis flavigularis*) were occupied with domestic cares. The first nursery was easily seen, no attempt having been made at concealment; it was situated only a foot from the soil, in a small *Lepidosperma* tussock, and was cup-shaped, deep, formed of strips of gum bark and grass, and lined with about equal parts of cowhair and wool. The dimensions were—5 inches across the top over all,  $2\frac{1}{4}$  inches across inside, and about the same inside depth. Two eggs reposed on the warm lining, one being *white*, the other of the usual pinkish hue, with many red spots at the apex, sparsely spotted over remainder of shell.

Another nest was placed in a larger tussock, and was fairly well hidden under loose strips of fallen gum-tree bark. It was constructed of grass, with some of the *Lepidosperma* blades passing diagonally through the sides and woven in; spider cocoons were also woven into the exterior, and the nest was situated close to a large, strong web, having a vertical shaft in which the obese arachnid lay hid. The cup-shaped nest was very deep, so much so that the female Honey-eater was almost concealed as she sat, only her head and pretty primrose throat showing at one side and her tail at the other, the body being packed well down, giving the impression of great depth and warmth. She sat without a movement while we watched, and a few days before, when visited by Mr. H. C. Thompson, had had the lens of a camera within a yard without betraying any fear, still cleaving to the eggs, which reposed on cowhair and a little wool.

A third nest was found in a similar situation, and contained three eggs just chipping on 28th October, and on 2nd November there were three young with eyes closed, the bodies partly covered with a blackish down. The eggs of this fine bird measure about  $.9 \times .7$  inch. The Striated Field-Wren (*Calamanthus fuliginosus*) sings sweetly his wild little ditty from the top of a tall tussock, stem of tea-tree, or fence-post, all through the cold, often wet.

months of winter and spring. He loves the swampy plains near the beach, where abound the great "saggs" or tussocks amid which he passes a large part of his existence. Our species was formerly considered identical with that of similar habitat on the mainland of Australia, but was separated by Mr. G. M. Mathews in his "Hand-list" of 1908, the Tasmanian form retaining the name of "*fuliginosus*," or "sooty," while the Victorian is distinguished as "*albiloris*."

By making my way through the swamps I have discovered a number of *Calamanthus* nests, several not being new, but well preserved, owing to their being packed away in snug positions. It has been stated that this songster builds *under* the overhanging tussocks and in the midst of small bushes; it may do so in some parts of the country, but in this district my experience has been that the domiciles are packed away right down *in* the tussocks, and usually towards the south-east side of the bunch of drooping blades, so as to be sheltered from the prevailing north-west winds, which sweep at times with much severity across Bass Strait. The structure is large and domed, with side entrance, made principally of dry grass mixed with a quantity of green moss, the sides thick and massive, so as to render it warm and cosy inside, this effect being considerably enhanced by the plentiful lining of feathers with which it is provided. A quantity of vegetable matter, such as portions of dry tussock-blades, is first put down into the clump where the blades converge towards the base, and this forms a foundation to keep the superstructure in position. In one of those found, an old nest seemed to form the base for the new one, to raise it well up from the wet, marshy plain. In many cases the top front of the nest appears to overhang and form a sort of eave to cast off rain or hail and keep all within dry and snug. In some cases, however, the lower lip of the entrance projects and the upper recedes, so that one can look down into the egg-chamber; in these instances the structure appears midway between a covered and an open nest.

The Spotted Diamond-Bird (*Pardalotus punctatus*), or, in ordinary parlance, the "Ground Diamond," may well be termed an *under-ground* builder, for it burrows horizontally or in a very slightly upward direction into the solid ground, and at the termination of this burrow excavates an incubation chamber in which to rear its brood. During the month of November Mr. H. C. Thompson and myself explored the recesses of one of these miniature tunnels made in the side of a hollow from which a gum tree stump had been removed, the soil being a fine white grit. The hole which marked the entrance was about 6 inches below the general ground level, and the tunnel went back about 12 inches—no light contract for a pair of tiny birds measuring each very little more than 3½ inches total length, to excavate so far in hard grit, with no tools but those of Nature's providing. At the end the burrow was enlarged to form a chamber, in which was placed the spherical nest with small side entrance, formed of fine strips of inner gum

bark intermixed with a few very fine rootlets. In this soft cradle reposed no fewer than *five* pure white eggs (the usual clutch is four) of a somewhat rounded shape, heavily incubated; we replaced them, and covered in the chamber as we had found it. The male bird had left the burrow as we approached, showing that he takes *some part*, at any rate, in the incubation.

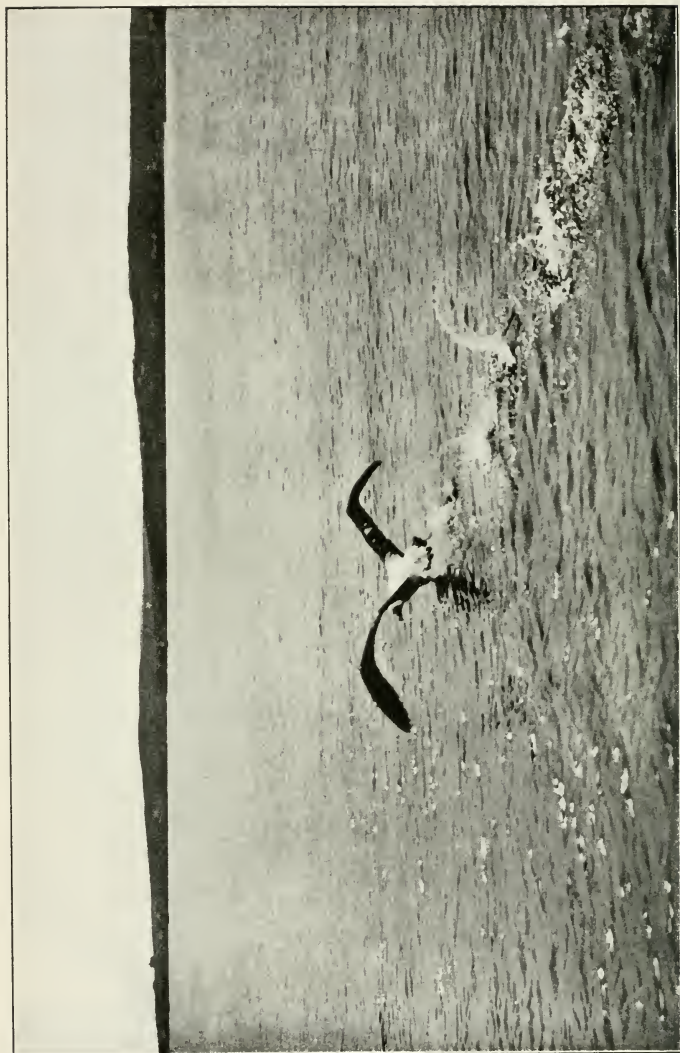
During the last week of October a tunnel of the Spotted Pardalote was investigated near the Devil's Punchbowl, Northern Tasmania. A nest was found ready for eggs in the terminal chamber, and was, as before, a sphere of fine gum bark, with side entrance. On another occasion, while exploring the vicinity of Distillery Creek, in the Launceston district, we encountered a large tree which had fallen during a gale, and which still had a quantity of soil packed into the hollow of the butt. Into this mass of earth a Pardalote had burrowed, and in the chamber at the end had formed a nest of dry grass, which was vacant. The bore was in just such a situation as depicted in Campbell's "Nests and Eggs of Australian Birds" as the breeding-place in Queensland of the Black-headed Pardalote, where the tunnel is driven into the soil still adhering to the butt of an overturned forest giant. It is contrary to the usual practice of the Spotted Diamond-Bird in Tasmania to construct its nest of grass, therefore the example cited above may possibly have been that of the Yellow-tipped Pardalote (*P. affinis*), or, in vernacular, the "Tree Diamond," because it generally utilizes a hole in a tree-trunk or branch, often at a considerable height, in which to place its grass nest. But it is said occasionally to make an earth bore, therefore it is possible that the tunnel among the upturned roots may have been the work of that species. As there were no eggs, nor could we see any birds about the trunk, it was not possible to make certain. The Yellow-tipped Pardalote is the lively little bird which appears in numbers in the springtime among the big eaculypts, calling incessantly "Pick-it-up! pick-it-up!" or, as some interpret the notes, "Wit-e-chu." While living in the forest near Table Cape, North-West Tasmania, I used to notice about the same time each spring this familiar call resounding among the trees where it had not been heard all through the winter months, and from this fact, and not seeing any of the birds themselves, I believe the Yellow-tipped species to be a migrant, although the Spotted Pardalote (*P. punctatus*) stays with us all the year. The Pipit (*Anthus australis*), popularly known as the "Ground-Lark," certainly does leave us in autumn, and reappears just about the same time in spring as the "Tree-Diamond," which is strong presumptive evidence in favour of the latter's migration. The Pipit is another of our ground-builders, constructing its cup-shaped nest of grass in a depression of the earth, usually under a tuft. This species has a curious sibilant note, something like "Ssssiou," and its song, delivered during a short ascending flight, partakes of the same sibilant character; the descent is accomplished by a slanting glide with wings outspread. It is one of our most familiar birds;

every paddock of short grass, racecourse, recreation ground, or similar enclosure has its one or more pairs of Pipits through the spring and summer.

SEAWEED AS A NESTING MATERIAL.—Some of the Sordid Wood-Swallows (*Artamus sordidus*), which visit us every year for nesting purposes from the mainland, did not go inland as usual this year (1915), but remained in the vicinity of Mersey Bluff to breed in the small white gums which are native there, and in the imported Monterey pines. During December, 1915, one of their nests was blown down from a tree close to the beach, and was found to be perfectly new and clean. The builders had made a new departure for Wood-Swallows (as far as my experience goes) by forming an outer nest or substantial foundation of dry seaweed from the beach, and then placing a light, ornamental, inner nest of fibres upon the weed. The foundation was mainly stems of hard, dry, black seaweed, with one or two small dry gum-twigs interwoven; on the sides were a piece or two of the weed with narrow blades, but stems formed by far the larger part. The upper nest was formed of very long light brown fibres (one measured 15 inches in length), curved into a shallow cup upon (and mostly within) the black outer nest. The measurements were:—Outer nest—width, 6 inches; height, 2 inches; inner nest—width outside, 4 inches; width inside,  $2\frac{3}{4}$  inches; depth,  $1\frac{1}{4}$  inches.

Mr. H. C. Thompson, of Launceston, has supplied me with details of nests which he and his son, Mr. P. C. Thompson, found in December, 1910, near Kelso, Northern Tasmania. The first was that of the Dusky Robin (*Amaurodryas vittata*), built in a niche in a gum-tree some 50 yards from the beach, and about 5 feet from the ground. The foundation was composed of black, narrow, dry seaweed, also a few pieces of green weed with velvety surface; sides of nest were of usual material—grass, pieces of bark, and a little spider-web—with a few pieces of seaweed interwoven. Measurements not taken, but about usual size. In the same district several pairs of Tree-Martins (*Petrochelidon nigricans*) were observed going in and out of an aperture, about 15 feet from the ground, in a very large gum-tree. Some of the birds were carrying pieces of seaweed 3 inches or 4 inches in length. Mr. Thompson and son obtained a ladder, and, having enlarged the opening, found that there were three nests some distance above the aperture. The birds had made a run from the aperture to the nests by placing seaweed upon the decayed wood. The nests were shallow depressions scraped in the wood-dust, with a few gum leaves and bits of seaweed for lining. Another nest was in the small hollow spout of a large gum, about 40 feet from the ground, and had to be reached with the aid of a rope. In the spout about 9 inches, a few pieces of grass and leaves and seaweed had been placed, and on this were three young Martins. All the nests were within 200 yards of the beach. Some of the weed used was green, but most of it was dry. On the beach seaweed was piled up in places to a height of 3 or 4 feet; it was in long pieces,





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Albatross Rising from the Sea.

FROM A PHOTO, BY J. DEGOTARDI.

about  $\frac{1}{2}$  inch in width, and very thin. I think this must be the *Posidonia australis*, Hooker, a "seaweed" but not an alga, as it belongs to the flowering plants (*Naiadca*); this comes ashore in great quantities at Devonport after a north-wester.

## Observations on Albatrosses at Sea.

BY EUSTACE W. FERGUSON, M.B., CH. M., SYDNEY (N.S.W.)

DURING a recent voyage to England and back to Australia I enjoyed numerous opportunities of observing Albatrosses, and, although my notes cannot be regarded as conclusive, in the absence of actual specimens procured, still I trust that my observations may not be devoid of interest, as showing something of the range of different species. Since my return I have had an opportunity of studying Mr. G. M. Mathews's "Birds of Australia," and my notes as regards species and sub-species are based, apart from my own personal observations, entirely on that work. The names given are those of Mr. Mathews's "List of the Birds of Australia" (1913), while in brackets are given the names appearing in the "Official Check-list of the R.A.O.U." (1913).

The outward voyage to England was commenced in the latter part of August, 1915, and was by the Suez Canal route; my observations on Albatrosses on this part of the trip were, therefore, limited to the portion of the Australian coast which lies between Sydney and Fremantle. The return voyage was by way of the Cape of Good Hope and Durban, and from South Africa across to Australia and round to Sydney Albatrosses were daily seen; this portion of the voyage occupied the month of January. On the way across the South Indian Ocean a south-easterly course was shaped from Durban down to about the  $41^{\circ}$  S. parallel, down which we ran our easting. After passing the south-west corner of Australia, a return was made to Fremantle, thence our course was across the Bight to Melbourne and round to Sydney.

**Diomedea exulans**, Linné (*Diomedea exulans*, Linnæus).

Sub-species:—

- D. exulans exulans*, Linné: South Atlantic Ocean, New Zealand, and East Australian seas.
- D. exulans rothschildi*, Mathews: South Atlantic Ocean, New Zealand, and East Australian seas.
- D. exulans chionopectera*, Salvin: South Indian Ocean.

In my trip I passed through the ranges of all three sub-species, and endeavoured to find some feature which would enable the different sub-species to be distinguished while on the wing. Many immature birds were noted, ranging from forms which were of a dark brown, with white face, white under wings, and pinkish bill, to forms in which the only evidence of immaturity remaining was a dark cap on the head. The following notes relate to birds which, except for the vermiculations on mantle and chest, were white-

bodied, and presumably adult. The different forms or phases in the coloration of the upper surface of the wings fall into five groups—

- (1) Wings all dark up to body, the line of demarcation sometimes straight, more frequently angulate outwardly in the middle.
- (2) Similar to (1), but with a small light-coloured spot farther out on the wing.
- (3) This spot joined up to light colour of back, the white thus extending in a triangular projection on to the wing.
- (4) The white portion extending much farther out in the mid line of the wing.
- (5) White-winged birds, in which the white colour extended to the angle of the wing, the line of demarcation running from the angle down to the lower edge of the wing at the base. In these birds the dark colour appeared to be confined to the primary coverts, the primaries, outer secondaries, and the tips of the inner secondaries.

*Vermiculations.*—As noted by Mr. Mathews, these varied inversely with the amount of white on the wings; in several specimens, seen at close range with a pair of x8 prismatic binoculars, no vermiculations could be detected.

*Tail.*—The amount of black on the tip of the tail appeared also to vary inversely with the amount of white on the wings. In many of the white-winged birds only one or two of the tail feathers were dark-tipped, and in several no dark tip could be detected.

On the voyage from Sydney till near Albany, specimens of *D. exulans* were observed almost every day, but no specimens were seen on the west coast. On the return trip these birds were observed near Fremantle and all round the southern Australian coast. Most of the specimens seen had the wings more or less dark, but my notes show that birds with white wings, corresponding to form 5, were seen in the seas of the Australian Bight.

On a voyage to New Zealand, some years ago, the forms of Albatrosses seen between Sydney and Auckland were carefully noted. All the forms enumerated above were observed, and, if these are to be all referred to *D. e. rothschildi*, then that subspecies would appear to pass through the same colour phases as the Indian Ocean birds.

The birds observed in the South Indian Ocean, in accordance with Mr. Mathews, I refer to *D. e. chionoptera*. All the above-enumerated forms were seen, but white-winged specimens were more common than on the East Australian coast. Several specimens noted had the primary coverts dappled with white, and one bird had, in addition, a white patch on the primaries of one wing. These birds were constantly present during the voyage from Durban to Australia. As a rule, there would be only one or two birds present in the early morning, but the numbers increased steadily during the day, until 40 or 50 birds would be following the vessel at dusk. Many of these Indian Ocean birds showed



Young Albatross, Swimming.

FROM A PHOTO. BY CHARLES BARRETT.

a distinct pink mark on the side of the neck near the nape. Although this was more commonly seen on the white-winged forms, several dark-winged birds were seen with this mark, though it was, as a rule, fainter in these birds. On the other hand, several specimens with a large amount of white on the wings were noted in which no trace of the pink coloration could be seen. Mr. Mathews states, under *D. e. rothschildi*:—"In life these birds have, on each side of the nape, a roseate-pink patch, which fades away entirely after death." I have no recollection of ever having seen such a mark on an East Australian bird, and have no note of its occurrence. On the return voyage, however, a bird was seen with evidences of a pink mark when east of Albany. Seeing that *D. exulans* is extremely common in the Great Australian Bight and Southern Australian seas, it would be of interest to know to what sub-species these birds belonged; probably, however, these waters form the mingling ground of the two races.

To *D. exulans exulans* I am probably correct in referring the

birds seen off the Cape of Good Hope. The first specimen was observed in the South Atlantic Ocean the day before we passed the Cape; subsequently five others were seen off the Cape. All agreed in having the dark coloration of the wings extending up to the body. No differences could be detected in the bills of the different races; all were of a pale fleshy pink, with yellow nail. No observations were made on the colour of the eyelids.

**Thalassarche melanophrys**, Temm. (*Diomedea melanophrys*, Temm.)

Sub-species :—

*T. melanophrys melanophrys*, Temm. : Cape seas.

*T. melanophrys belcheri*, Mathews : Kerguelen.

*T. melanophrys impavida*, Mathews : Australia and New Zealand.

*T. melanophrys richmondi*, Mathews : South America.

Mathews distinguishes these sub-species by differences in the size and coloration of the bill, in the grey loreal wash, and in the extent of the dark mark over the eye. These differences are, however, not readily distinguishable at sea. No very young birds were observed, but evidences of immaturity were seen in a number of specimens. These evidences consisted of a dark yellowish-brown bill with darker tip, under wings with the light colour forming a narrower band and darker grey in colour, and of a dark mark descending from the mantle on either side of the neck. The colour of the bill appeared to be the last evidence of immaturity to disappear. An immature specimen was noted off the Cape of Good Hope, and was probably referable to the first sub-species. A second specimen, fully adult, was seen on the 10th of January in  $41^{\circ}$  S.  $51^{\circ}$  E. From 13th January to 18th January either one or two were seen daily. When two were present they always were an adult and an immature bird. It is, therefore, possible that the same two birds followed us during this time. The course run between these dates was from  $73^{\circ}$  E. to  $107^{\circ}$  E., and these birds are, therefore, probably referable to *T. melanophrys belcheri*. On the 21st January these birds were again seen, and became very numerous. The vessel was now to the south of Australia. The species appears to be most abundant in the Great Australian Bight; on both occasions of crossing the Bight this species was the commonest bird seen. On the east coast of Australia they are less numerous, but I have seen several specimens. On the west coast I have noted this species as far north as Cape Naturaliste. The species is also very common in the Southern Ocean, between Hobart and New Zealand.

**Thalassogeron chrysostoma**, Forster (*Diomedea culminata*, Gould).

Sub-species :—

*T. chrysostoma chrysostoma*, Forster : Cape seas.

*T. chrysostoma harterti*, Mathews : South Indian Ocean.

*T. chrysostoma culminatus*, Gould : Australia.

*T. chrysostoma mathewsi*, Rothsch. : New Zealand.

I think that I am right in referring the birds I saw to this species rather than to *T. bulleri*, which has a similarly-coloured bill. Dark-headed Albatrosses were seen on several occasions. The first specimen was observed on the 12th January, in  $41^{\circ}$  S.  $66^{\circ}$  E.; another, or the same bird, was seen on the following day. No further specimens were seen until 17th January, in  $41^{\circ}$  S.  $100^{\circ}$  E., and 18th January, in  $41^{\circ}$  S.  $107^{\circ}$  E. All the specimens observed agreed in coloration of head and bill. The head and neck were of a dusky grey, rather lighter on the neck, and the crown of the head was almost pure white. The bill was dark, with a conspicuous yellow culmen and yellow along the lower edge of the mandible. This bird agrees best in its coloration with the sub-species *T. c. harterti*, and this identification agrees with its range.

**Nealbatrus chlororhynchus.** Gmelin (*Diomedea chlororhynchus*, Gmelin).

In most works this species appears under the genus *Thalassogeron*, but Mathews has separated it subgenerically, introducing the name *Nealbatrus*. There appears to be still a considerable amount of confusion existing as to the number of sub-species to be recognized. Mathews regards as belonging to the typical sub-species *N. c. chlororhynchus* the birds that occur in the South Atlantic, and refers our Eastern Australian birds to *N. c. bassi*, Mathews, and the Western Australian birds to *N. c. carteri*, Roths. The chief difficulty seems to be in the changes of the coloration of the bill. As is well known, *Thalassogeron carteri* was described from a single specimen with an entirely black bill; this Mathews regards as an evidence of immaturity. A species with yellow culmen certainly does occur on the Western Australian coast, as Mr. Alexander has already recorded. I met with numerous specimens off the Leeuwin in August, and again in January; among the yellow culminate birds on both occasions one or two were seen with all black bills. The species appears absent or rare in the Great Australian Bight; I have noted one as seen on 26th January, when in  $37^{\circ}$  S.  $126^{\circ}$  E., but no others were seen until passing Cape Liptrap. On the East Australian coast this species is the commonest "Mollymawk" met with, and I have frequently seen it in Sydney Harbour. It is very common between Sydney and Brisbane. Despite numerous observations, I have no note of ever having seen a black-billed form on the eastern coast. Mr. Mathews distinguishes the two sub-species owing to differences in their range, and my observations certainly seem to support this idea. Albatrosses noted off the Cape of Good Hope appeared to belong to this species, but were too far off to enable the bill to be distinguished clearly. The species was observed outside Durban, and on two occasions on the voyage across the South Indian Ocean, on the 10th and 11th January, when in  $41^{\circ}$  S.  $51^{\circ}$  E. and  $41^{\circ}$  S.  $59^{\circ}$  E. respectively, but were not again seen until close to the Australian coast. The bird seen on the 11th had the culmen reddish-orange. Mathews appears to think that this is a stage

in the change of coloration of the bill before the fully adult yellow culmen is reached. This bird, however, appeared to be fully adult otherwise, and it may be worth noting that among Australian birds I have never observed one with the culmen reddish-orange. In the Durban Museum there were two specimens of *T. chlororhynchus*; one, marked male, had the culmen reddish-orange, while the other, which was marked female, had the culmen yellow. It is possible, therefore, that the colour difference is sexual, and distinctive of the South African sub-species.

**Diomedella cauta**, Gould (*Diomedea cauta*, Gould).

Mr. Mathews has also separated this bird sub-generically from *Thalassogeron*, and distinguishes three sub-species—

*D. cauta cauta*, Gould: Eastern Australia.

*D. cauta salvini*, Rothschild: New Zealand.

*D. cauta layardi*, Salvin: Cape seas.

I believe that I have seen *D. c. salvini* off the New Zealand coast, and a specimen observed on the present voyage, off the Cape of Good Hope, was probably referable to *D. c. layardi*. My notes on this species, however, are chiefly of the Australian and typical form. It is common in Bass Strait, and does not seem to come much further up the eastern coast than Cape Everard, though on one occasion I saw a single specimen not far south of Sydney. On our westward voyage we lost this species about the division between Victoria and South Australia. I have also seen this species to the south of Tasmania. As its name indicates, this Albatross is somewhat shyer than the other species, rarely following the vessel, but it frequently approaches close enough to be recognized, and even at a distance it is distinguishable by the colour of the under surface of the wings, these appearing all white except for a black tip. The bill is more whitish in the Australian forms than is shown in Mr. Mathews's figure; possibly it darkens after death.

When off the Cape of Good Hope an Albatross was seen which I cannot refer with any certainty to this species. The head was smoky-grey, and the under wings white with black tip, but the bill could not be seen. The specimen which I refer to *D. c. layardi* was seen on the afternoon of the same day, and had a white head.

**Phœbetria fusca**, Hilsenberg (*Phœbetria fuliginosa*, Gmelin).

As shown by Mr. Mathews, *P. fuliginosa*, Gmelin, does not apply to this bird, but to *P. palpebrata*, Forster. Mathews divides the species tentatively into two sub-species—

*P. fusca fusca*, Hilsen.: South Atlantic and Indian Oceans.

*P. fusca campbelli*, Mathews: Australian seas.

I saw this species on numerous occasions, and was able to see clearly the distinctive yellow mark on the mandible. On the

outward voyage, in August, numerous specimens were noted, in the Great Australian Bight, of a uniformly sooty Albatross with a white ring round the eye, interrupted in front; none was seen near enough to distinguish the yellow mark on the mandible. On the return voyage the first specimens were seen on 10th January ( $41^{\circ}$  S.,  $51^{\circ}$  E.) The white post-orbital annulus was clearly visible, as also the yellow mark along the mandible. After this date this species was seen daily, with one exception, up till 22nd January. On that date the Western Australian coast was in sight, in the neighbourhood of Cape d'Entrecasteaux. Returning towards Melbourne, this species was again seen in the Great Australian Bight on three consecutive days after passing the south-west corner of Australia. No differences could be detected between the birds seen in the Indian Ocean and those in Australian seas. Mathews gives the difference as the larger size in all its dimensions of the western form. Such differences are not appreciable at sea, but it would be of interest to know the limits of the ranges of the sub-species.

### **Phœbetria palpebrata**, Forster.

Sub-species:—

*P. palpebrata palpebrata*, Forster: South Indian Ocean.

*P. palpebrata huttoni*, Mathews: East Australia and New Zealand.

*P. palpebrata antarctica*, Mathews: South Atlantic.

I refer to this species a sooty Albatross which was seen on several occasions. My first record is on 13th January ( $41^{\circ}$  S.  $73^{\circ}$  E.), when one was seen; thereafter specimens were seen on 16th January ( $41^{\circ}$  S.  $93^{\circ}$  E.), 26th January ( $37^{\circ}$  S.  $126^{\circ}$  E.), and 28th January ( $38^{\circ}$  S.  $139^{\circ}$  E.) The first two specimens seen probably belong to the sub-species breeding on Kerguelen Island, and those on the latter two dates to the bird breeding to the south of New Zealand, but the coloration appeared to be the same in all. The Australian birds, however, were seen at a much closer range. I noted the following coloration in the two specimens seen on the 26th January:—Face black; neck and back of head white, extending on to crown; body below light brown; legs light-coloured; bill black, no yellow mark discernible on the mandible; no white annulus behind the eye. These birds were a good deal whiter on the neck than shown in Mathews's plate, and, moreover, had no white ring behind the eye, and the feet appeared whitish instead of pink. The white annulus could hardly have been missed, as the birds were seen at close range, and in *P. fusca* the white ring is visible at a good distance. Possibly the specimens seen were not fully mature.

It might be mentioned that as Albatrosses were seen at varying times during the day, the positions given are the noon readings to the nearest degree.

## Description of Australian Birds' Eggs Hitherto Unrecorded.

BY H. L. WHITE, R.A.O.U., BELLTREES (N.S.W.)

### *Platycercus splendidus*, Gould.

Clutch four to seven; eggs pure white, shell without gloss and thickly pitted all over with minute holes, many nodules being in evidence in some cases.

Measurements, in inches, of a clutch of four taken by me at Belltrees, N.S.W., 20/9/15:—(a) 1.02 x .86, (b) 1.01 x .84, (c) 1.04 x .87, (d) 1.08 x .85.

Eggs placed 12 inches down in the hollow of a stump standing about 10 feet high.

The eggs of different clutches vary considerably in size and shape, but are generally not distinguishable from those of *Platycercus eximius*.

### *Ethelornis (Pseudogerygone) magnirostris whitlocki*, Mathews.

I am not an advocate for the splitting of species unless there are some marked differences. In the case of the bird in question, my specimens vary considerably from those of eastern Australia, the eggs are different from any others of the genus I have seen, while I know of no previous record of the Large-billed Fly-eater from Western Australia.

The nest, a very neat dome-shaped structure composed of shreds of bark and spider-web, was placed in a mangrove tree at a height of 8 feet above the mud on the tide line. Time occupied in building, 16 days.

Clutch of two eggs, ground colour white, with reddish-brown dots and splashes, rather plentifully distributed over the larger end, but sparingly elsewhere. Shape long oval; texture of shell fine and without gloss.

Measurements in inches:—(a) .72 x .47, (b) .73 x .47.

Except in size, the eggs are almost identical with those of *Glyciphila fasciata*, Gould.

Locality.—Port Hedland, W.A.

Collected by F. Lawson Whitlock, 28/10/14.

## Reminiscences of a Field Collector.\*

BY A. J. CAMPBELL, C.M.B.O.U., MELBOURNE (VIC.)

ONCE, when I was going afield, I met an enthusiastic friend, who was proceeding to a land sale. Patting me on the shoulder, he said—"Sell your bird-eggs, old man, and put the money into land." The big boom broke. He lost his land; my egg

\* These notes were read at a meeting of ornithologists, held in Melbourne, on the occasion when Mr. Campbell presented his collection of Australian birds' eggs to the National Museum, Victoria.

collection is still intact. That is history. It is difficult to state what is the intrinsic or scientific value of a natural history collection. To accomplish any great object in life, there must be a passion. You cannot materialize one's passion—be it music, painting, or nature-study—any more than you can value one's artistic temperament in terms of £ s. d.

One likes to study birds because they are the most happy and healthy of creatures. Whoever saw a sick bird, except in caged confinement? Birds in the open are always joyous. Listen to their lively lays at break o' day—never ill. Besides the beauty of birds, the colour and markings of some eggs are most attractive. Their graceful shapes, whether globular, oval, or elliptical, are all emblems of true infinity. In my book, "Nests and Eggs," maybe I have said sufficient descriptive of the eggs and the domestic economy of our Commonwealth birds. Perhaps I may here recite a few incidents in travel that occurred while procuring my specimens.

I have been twice shot at. In the early days of Ferntree Gully (Vic.), we (four of us) were on the road, at night, to the Dandenongs, walking every yard of the way. Near what is now known as Wheeler's Hill a drunken fellow wanted to know "Who the —— are you?" We replied, "Look out, our guns are loaded." "Oh, is it shooting you mean? I'll meet you with a gun." So the rascal said, rushing into a shanty near. In the meantime we took to our heels and turned sharply aside into the bush. When the drunkard reappeared, he, supposing we had continued our way up the road, fired in that direction. We could distinctly hear the "ping" of the bullet. Being about midnight, we camped in the scrub where we were, and continued our journey at day-dawn. By the way, I recollect that on this trip we saw the lovely little Chestnut-shouldered Grass-Parrot. It used to frequent the fertile flats of Ferntree Gully. We believe that this beautiful bird is now extinct. On another occasion we were shot at in broad daylight by a land-owner, somewhere in the locality of what is now known as Murrumbeena (Vic.) It is true the landlord warned us off his grounds, but we had found a Bronze-winged Pigeon's nest in a knot of mistletoe, with the bird sitting, and we were loth to leave. Presently we espied the owner sneaking down upon us along an acacia hedge. One of us shouted, "Look out, he's got a gun," and away we sped. There was a "bang," and buckshot scattered about us. We have not been in that paddock since. Another shooting incident was connected with a bullock. In an open paddock near Oakleigh (Vic.) we were charged by a wild Gippsland bullock. The beast would have certainly horned us had not one shot it in the face, and temporarily stayed its progress. We were sorry, but there was no other means of escape.

On two occasions horses bolted with the coach I was on, each time from the same cause—namely, a thoughtless tramp basking in the sun alongside of the road—his head on his swag and his

knees drawn up before him—a scarecrow sufficient to frighten the meekest of horses. Returning from Fern-tree Gully with a Lyre-Bird's nest sewed in some sacking—which, by the way, together with a pair of birds, I donated to the Royal Scottish Museum, Edinburgh—we had just crossed Dandenong Creek, and, turning a sharp curve, the pair of horses suddenly caught sight of the recumbent figure. However, we did not break a buckle. The other occasion was in Riverina. This time the team consisted of four-in-hand. Being on the box seat, I noticed the figure of a man ahead upon the ground (I thought the driver saw it too, but he evidently did not). I immediately thought of the Dandenong Creek episode, and called to those inside to "look out for some fun." No sooner had I uttered the words than the team left the track and tore through the timber, a great bushy tree nearly sweeping the driver off his seat. However, courage and good horsemanship steadied the team before any damage was done. It was a very narrow escape, and we were miles from anywhere. But you should have heard the poetry heaped upon the head of the unfortunate "sundowner." I never before knew that a coach-driver's vocabulary was so inexhaustible.

Incidentally, through collecting trips I have enjoyed some sport fishing—seine fishing by the sea (notably on island excursions), and hooking, with rod and line, cod and plump perch out of the broad-bosomed Murray. And members who went with the R.A.O.U. to Kangaroo Island will remember the creeks there alive with bream, which were sometimes hooked two at one cast of the line. But I never took to shooting birds for sport. "Virtue has its own reward." On that strip, once sand and scrub, between St. Kilda and Sandridge (Vic.), which is now a forest of houses, known as the Beaconsfield-parade, I used to kill snakes and pick up Dottrels' eggs in doublets. There were swamps contiguous, teeming with wild fowl. At a wheeling feathered flock one day a man fired. Out of the destruction two Wood-Ducks fell near me. As the man was not legally entitled to them, I bagged both birds and bolted home.

Numerous Ducks used to fly overhead in small flocks up and down the River Yarra. At evening they usually flew up stream, offering tempting shots for long-ranged guns. One evening, when "mooning" near Como Swamp, Toorak, I heard a distant shot round the bend, and some considerable time afterwards a fine, fat Black Duck fell at my feet, stone dead. There being nobody about, I quietly picked up the bird and took it home.

Once I was in a slight railway accident. The carriage in which we were travelling left the rails, and bumped considerably when off the right track—indeed, nearly capsized before the train was pulled up. What concerned me most was a bright and beautiful clutch of Kestrel's eggs which I had, unblown, in a "billy" beneath the seat. I took the eggs that day from a crevice of a cliff overhanging the Werribee River.

Someone has asked me what I consider my greatest finds. I can hardly say. But those of most lasting memories to me are probably the finding of my first Lyre-Bird's nest—the excitement of flushing the sitting bird, with its loud, whistling shriek of alarm as it flew down gully. Then, when your excitement subsides, there is the admiration for the picturesque nest, with its virgin forest and fern surroundings. Or, perhaps, it would be the first finding of an Emu's nest. You notice the noble bird tear away through the belt of box timber, and on going to the starting point there you behold, upon a bed amidst the cane-grass, the clutch of eight or ten large and beautiful greenish eggs. Or it may be when you land on an out-of-the-way islet, at a sea-bird rookery. Then your nerves tingle from head to foot in an ecstasy of extreme delight while hundreds of wild birds, on shivering wings, are screeching overhead, and you see mottled and curiously marked eggs amongst grass, succulent ice-plant, or on the bare sand, as the case may be, in numbers dotting the landscape.

Another indelible memory was a scene I witnessed only last year, when, with a genial companion, I visited a Swiftlet cave on a verdure-clad islet—a secluded spot set in a blue sheet of coral sea. It was the most splendid of serene summer days, and the place the most picturesque that one could imagine. Bean-trees wreathed with rosy flowers, and umbrella-trees and palms, reared their graceful forms above luxuriant scrub. Underneath were rich, rocky galleries of native gardens where grew great patches of an ornamental polypodium, bearing brownish, flat, embroidered fronds. Here and there, on tree or stone, were orchids conspicuous with bowing heads of bottle-brush-like flowers—*i.e.*, composed of clusters of tubular flowerets of waxy appearance, variegated crimson, green, and white (*Dendrobium Smilliae*, von Mueller). From the dazzling sunlight we entered the deep shade of a canopy scrub, then a gloomy cavern, where between 50 and 60 Swiftlets' nests could just be discerned attached to the roof. A score of nests contained each a single pure white egg. Closer examination by the aid of a pocket electric lantern showed the nests in groups, distant from the floor from 4 feet up to about 7 feet. Some nests were adjoining, so that tails of the tiny brooding birds overlapped. The nests were spoon-shaped, about  $2\frac{1}{2}$  inches in diameter, with a short, handle-like appendage cemented to the rock, and were composed of shreds of grass, moss, &c., intermixed with a kind of gluten. The little birds, on being disturbed, flew quietly, save for a few feeble notes, like fairy forms about the cave, or in and out, there being more than a single entrance.

In concluding this brief sketch of some of my reminiscences, I must say that "the lines have fallen unto me in pleasant places." I have often thanked the Almighty for my being and for the wonder of His works.

## Camera Craft Notes.

**Effects of Sunshine.**—Bird photographers well know that strong sunlight, though generally helpful, is occasionally troublesome. This fact was emphasized in photographing a female Red-capped Robin (*Petroica goodenovii*).

The camera used was half-plate, but a piece of cardboard fitted in front of the ground-glass enabled one to take quarter-plate size pictures, and the two in the print belong to the one negative. They were taken from the same stand, but, of necessity, the body of the camera had to be turned slightly to get the focus for the



Female Red-capped Robin.

FROM PHOTOS. BY A. H. CHISHOLM.

second exposure ; that simple move made all the difference. The bird did not sit long enough for one to note the position of the sunlight on the little figure, but developing the plate revealed an interesting contrast. In the first snapshot the bright light had thrown the bird's breast and the inside wall of the nest into a most pleasant contrast with the shadowed front of the structure ; but in the second attempt it had struck right across the Robin's head, thus rendering the photograph useless as anything more than a curiosity.—A. H. CHISHOLM. Brisbane, 19/2/16.



Chestnut-breasted Finches.



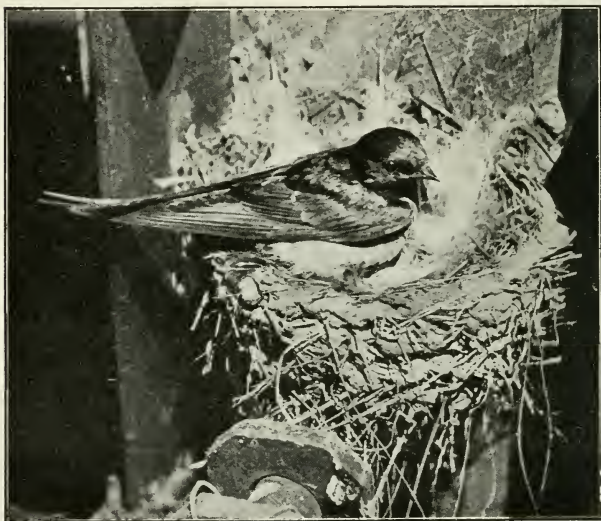
**Fantails and Swallows.**—Bird photographers, especially those using inexpensive cameras, very often find themselves in difficulties through lack of sufficient light to admit of the short exposures usually necessary when dealing with adult birds. In November, 1915, we located the nest of a pair of Rufous Fantails (*Rhipidura rufifrons*), overhanging a creek in a deep fern gully. It was our first experience of the nest since taking up photography, and our anxiety to obtain pictures of the birds accounted for the use of many plates. So far as the tameness of the birds was concerned, the case presented no difficulty. On account of the bad weather at the week-ends and the natural darkness of the gully, however, several exposures, ranging from one twenty-fifth to half a second, failed to make an impression on the plates. It was then, almost as a last resource, that we decided to try long exposures of the bird on the nest—a system we had not previously tried. The birds appeared to face the ordeal so well that we gradually



Rufous Fantail.

increased the exposure until it had reached about 10 seconds. On developing, we were surprised to find that in no case was there any indication of the bird having moved.

For a long time we were unable to obtain photographs of the Welcome Swallow (*Hirundo neoxena*), on account of the darkness of the position usually chosen for the nest. For this reason numbers of nests under verandahs, bridges, &c., had to be reluctantly passed by. At last a nest was found built in the target pit of the rifle range at Meredith, Victoria, which gave



Welcome Swallow.

FROM A PHOTO. BY R. T. LITTLEJOHNS.

better hope of success. As usual, the position was dark, but fortunately the sunlight was easily admitted by drawing aside the lid of the pit. After a couple of hours' wait the birds became accustomed to the presence of the camera and to the absence of their roof, and the picture reproduced was obtained.—R. T. LITTLEJOHNS and S. A. LAWRENCE. Melbourne, 7/3/16.

\* \* \*

**Birds in Drought Time.**—The long-continued drought of 1914-15 has caused many of our birds to wander far from their usual haunts in search of food and water, and creeks and water-





Chestnut-eared Finches.

holes have remained dry for many months. We make it a practice always to keep water available for the wild birds, and so many species visit the garden and paddock. A small tank, always full of water, is very popular with the birds, and offered facilities for photographs. A box fixed to a rail close to the tank, with a hole cut in the side facing the tank, for the lens, held the camera. A small T hinge, with the arm swinging free, was fixed to the rail, the bulb of the shutter placed in its grip, and a long cord attached. Then one had just to watch and wait patiently until the birds were in the desired position; a sharp jerk released the shutter, and the picture was secured.

The following birds have made it a practice to come to my tank for drinking and bathing purposes, and photographs of some have been obtained:—Helmeted Friar-Bird (*Tropidorhynchus buceroides*), Friar-Bird (*T. corniculatus*), Little Friar-Bird (*Philemon sordidus*), Yellow Honey-eater (*Ptilotis flava*), Yellow-spotted Honey-eater (*P. notata*), Dusky Honey-eater (*Myzomela obscura*), Brown Honey-eater (*Stigmatops ocellaris*), White-throated Honey-eater (*Melithreptus albigularis*), \*Striped Honey-eater (*Ptilotis lanceolata*), Blue-faced Honey-eater (*Entomyza cyanotis*), Black-headed Pardalote (*Pardalotus melanocephalus*), Sun-Bird (*Cyrtostomus frenatus*), \*Butcher-Bird (*Cracticus destructor*), Black-throated Butcher-Bird (*C. nigrigularis*), Crow (*Corvus coronoides*), Spangled Drongo (*Chibia bracteata*), Lesser Red-browed Finch (*Aegintha minor*), Chestnut-breasted Finch (*Munia castaneothorax*), \*Chestnut-eared Finch (*Teniopygia castanotis*), Magpie-Lark (*Grallina picata*), Red-backed Wren-Warbler (*Malurus cruentatus*), Black-faced Cuckoo-Shrike (*Graucalus melanops*), Leaden Flycatcher (*Myiagra plumbea*), Black-and-White Fantail (*Rhipidura motacilloides*), Pheasant Coucal (*Centropus phasianus*), Lesser Brown Kingfisher (*Dacelo minor*), Leach Kingfisher (*D. leachi*), Forest Kingfisher (*Halcyon macleayi*), Barred-shouldered Dove (*Geopelia humeralis*), Tranquil Dove (*G. tranquilla*), Little Green Pigeon (*Chalcophaps chrysochlora*).—E. M. CORNWALL. Mackay (Qld.), 18/1/16.

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**Wood-Swallows.**—In my experience, Wood-Swallows are difficult to photograph. Their nests are built at no great height—from two or three feet to about 15 feet from the ground being the general range, though I have found several in fairly lofty positions. As a rule, then, one has no more trouble in focussing on a Wood-Swallow's nest than on a simple landscape. Photographs of young birds are easily obtained, but the adults try one's patience. They skim over and around the nest, make vicious dives at the photographer, and then retire to a favourite perch for a few minutes' rest. This procedure may be repeated at short intervals for several hours, when, if Fortune smiles, a

\* Drought visitors.

plate can be exposed. Often, however, patience is practised in vain.

In Riverina I obtained several pictures of White-browed Wood-Swallows (*Artamus superciliosus*) after spending the best part of a broiling day behind a packing case in a small paddock at Jerilderie. The nest was in the top of a coil of wire netting, standing by a post-and-rail fence. It contained three nestlings, about five days old. The female was sheltering the brood from the sun (the temperature was about 102° in the shade), quivering her wings to fan them, or else because of her own distress in the



White-browed Wood-Swallow at Nest.

FROM A PHOTO. BY CHARLES BARRETT.

heat; her beak was gaping most of the time. She flew to a clothes-line in a yard adjoining the paddock when I appeared on the scene, and nearly an hour passed before she approached the nest again. When she did it was only to alight for half a second, flash a glance at the chicks, and dart back to her perch. Later she became more venturesome, and I was able to expose three plates (with good results, as it proved). All this time the male bird was in view, but declined to come within range of the lens. He was very angry, and frequently swooped at the camera. When I went into hiding he seemed puzzled for a while, but,



Helmeted Friar-Bird (Drinking).



having located me behind the packing case, flew over it several times.

Occasionally both birds perched on the clothes-line, and seemed to take counsel together. After noon they began to collect food—midges, small moths, and one or two grasshoppers—with which they approached the nest, only to lose heart when within a few feet of it. This continued for half an hour, when the female, always the bolder of the pair, alighted on the edge of the coil of wire netting and fed one of the chicks. Her confidence increased, and she returned with food five or six times. I despaired of getting a photograph of the male, but at the eleventh hour he summoned sufficient courage to spend a second at the nest; the shutter clicked, and my long vigil was rewarded.

Last season (1915), on Kulkyn station (Vic.), I again attempted to photograph White-browed Wood-Swallows. The nest was about five feet from the ground, in a gum-tree stump, and contained two eggs. The birds were even more wary than those of Jerilderie, and I had to be content with a photograph of the nest, though the camera was in position for some hours.

In January, 1916, a large number of White-browed Wood-Swallows nested in a paddock at Greensborough (Vic.) Most of the nests were low down in sweetbriar rose bushes. All the birds, judging by the nests observed, laid about the same time. Photographs of nestlings were secured, but the parent birds eluded the camera. This paddock, with its little gully covered in briar bushes, dogwood, and eucalypt saplings, was a haunt of many birds besides the Wood-Swallows.—CHARLES BARRETT. Melbourne, 6/2/16.

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### Stray Feathers.

**Range of Rosella**—Since my article upon *Platycercus splendidus*, Gould, appeared in *The Emu*\* I had occasion to visit a property owned by my firm, situated about 60 miles due east of Scone and 30 miles inland from the coast. There I found *Platycercus splendidus* to be the local "Rosella," confirming my theory that the range of the bird extends to the ocean, or thereabouts.—H. L. WHITE. Scone (N.S.W.)

\* \* \*

**Bell Miners**.—With regard to the statement made by Messrs. Campbell and North, to the effect that the Bell Miner (*Manorhina melanophrys*) is extremely local in its habit, I noted at our North Coast property that a colony of the birds never moves, apparently, from a certain bend in a brush-covered creek. For the past three years I have visited the spot pretty regularly, and found the Bell Miners always present, while the man in charge states that during

\* *Emu*, vol. xv., pp. 169-176.

his five years' residence he has never noted their absence. The birds' haunt is close to a favourite camp and watering place for the cattle, so is visited rather frequently by the overseer. He knows of no other colony on the estate. The area occupied is not more than 30 acres. It is covered by a dense growth of the usual North Coast scrub timber, as well as by many lofty eucalypts. It is almost isolated by ring-barked and scrub-cleared lands, but there is plenty of similar country within a mile.—H. L. WHITE. Scone (N.S.W.)

\* \* \*

**Rapacity of Owls.**—Recently, when exploring a dense gully, I found a Powerful Owl (*Ninox strenua*) perched in a wattle-tree, and having in its talons the body of a black "flying squirrel" (*Phalanger*). A few small stones caused the bird to take flight, carrying its prey with it. The latter, however, caught in the twigs, and was dropped. On examination it was found that the head, internal organs, and the fore half of body were missing, having presumably been devoured. As the flesh was fresh, the animal had evidently been killed on the previous night. The "squirrel" was a large one of its kind, and probably weighed  $2\frac{1}{2}$  lbs. when alive. As it was more than three-parts devoured, and allowing half a pound for bones and skin, &c., the Owl's meal had consisted of about  $1\frac{1}{4}$  lbs. in weight, eaten in, say, 12 hours at a long estimate. I have also seen the Boobook Owl (*N. boobook*) flying with a ring-tailed possum, apparently as large as itself. It would appear that the Owls carry a larger prey in proportion to their size than do the Hawks. On moonlit nights the *Podargus (Podargus strigoides)* is frequently seen on a fence overlooking a ditch full of frogs. If these birds take an occasional frog, then the name "Frogmouth" is doubly appropriate.—A. E. RONDA. R.A.O.U. Warburton (Vic.), 16/11/15.

\* \* \*

**Birds Observed on Barrington Tops, N.S.W.**—The Maitland District Scientific and Historical Research Society, in December, 1915, organized an excursion to the Barrington Tops, a plateau lying between the Hunter and Manning Rivers, and from which the Barrington, Gloucester, Karuah, Paterson, Williams, and Chichester Rivers rise. The plateau is the highest land mass, except isolated peaks in New South Wales, outside of the Kosciusko region. The average height of the part visited was between 4,500 feet and 5,000 feet in height. For five or six months of the year snowfalls occur, and midsummer frosts are not rare. The chief object of the expedition was to ascertain the geology of the region, and, if possible, get information that would throw light on our glacial problems. Entomologists, with a botanist, geologist, and conchologist, accompanied the expedition to the plateau, which, scientifically, was unknown. It is visited only by hunters and a few cattlemen. The southern part of the district which the party visited is without



Helmeted Friar-Birds.



permanent residents. There are two selectors there, who occupy their holdings during the summer months. Mr. S. A. Hanscombe, R.A.O.U., was to have accompanied the party as ornithologist, but unforeseen events prevented him at the last moment. The accompanying list of birds observed on Barrington Tops, 27th to 30th December, is by Mr. John Hopson, jun., of Eccleston, who for many years has been a keen observer of birds and their habits:—Black Duck (*Anas superciliosa*), Wedge-tailed Eagle (*Uroaëtus audax*), Brown Hawk (*Hieracidea berigora*), Nankeen Kestrel (*Cerchneis cenchroides*), Boobook Owl (*Ninox boobook*), Black Cockatoo (*Calyptorhynchus funereus*), Crimson Parrot (*Platycercus pennanti*), Laughing Kingfisher (Jackass) (*Dacelo gigas*), Sacred Kingfisher (*Halcyon sanctus*), Spine-tailed Swift (*Chætura caudacuta*), Fan-tailed Cuckoo (*Cacomantis flabelliformis*), Victoria Lyre-Bird (*Menura victoriae*), Tree-Martin (*Petrochelidon nigricans*), Flame-breasted Robin (*Petroica phœnicea*), White-shafted Fantail (*Rhipidura albiscapa*), Satin Flycatcher (*Myiagra nitida*), Coach-whip-Bird (*Psophodes crepitans*), Rufous Song-Lark (*Cinclorhampus rufescens*), Yellow-tailed Tit-Warbler (*Acanthiza uropygialis*), White-browed Scrub-Wren (*Sericornis frontalis*), Wren-Warbler (*Malurus cyaneochlamys*), Grey Shrike-Thrush (*Colluricincla harmonica*), Black-backed Magpie (*Gymnorhina tibicen*), Black-throated Butcher-Bird (*Cracticus nigrogularis*), White-throated Tree-creeper (*Climacteris leucophæa*), White-eye (*Zosterops dorsalis*), Red-tipped Diamond-Bird (*Pardalotus striatus*), White-naped Honey-eater (*Meliphreptus lunulatus*), Spinebill Honey-eater (*Acanthorhynchus tenuirostris*), Singing Honey-eater (*Ptilotis sonora*), White-eared Honey-eater (*P. leucotis*), Noisy Miner (*Myzantha garrula*), Wattle-Bird (*Anthochaera carunculata*), Satin Bower-Bird (*Ptilonorhynchus holosericeus*), Short-billed Crow (*Corvus bennetti*), Pied Bell-Magpie (*Strepera graculina*), Spur-winged Plover (*Lobivanellus lobatus*). A nest of the Rosella was found. It contained four young birds; two were of the normal colour, the others were what is popularly called "sports"—that is, where the green should have been was yellow, the black and blue changed to white, the red had not altered.

\* \* \*

**Procellariiformes in Western Australia.**—In *The Emu*\* Mr. W. B. Alexander has, under the above title, given a list of Petrels authentically known from Western Australia, as well as a list of species whose inclusion in the Western Australian avifauna is open to question. During a recent voyage to England and back I twice passed along the Western Australian coast, and made careful notes of the species observed, as far as identification was possible without handling specimens. I noted the following species:—

*Thyellodroma pacifica chlororhyncha*, Lesson (*P. sphenurus*,

\* *Emu*, vol. xv., pp. 182, 183.

Gould).—This is probably the species which was commonly seen approaching Fremantle. Alexander gives Rottneest Island as a breeding-place.

*Hemipuffinus carneipes carneipes*, Gould (*P. carneipes*, Gould).—A yellow-billed Shearwater was observed off the south-west coast, in the vicinity of Chatham Island; probably it was this species.

*Aestrelata lessonii leucocephala*, Forster (*Estrelata lessoni*, Garnot).—Mr. Alexander records one specimen obtained at Cottesloe. I observed this bird frequently in the western half of the South Indian Ocean, but the nearest record to Western Australia was on 20th January, in 40° S. 120° E.

*Daption capense australe*, Mathews (*D. capensis*, Linné).—This bird was observed on 29th August in some numbers. The ship was at the time approaching the south-west corner of Australia from the east, and land to the east of Albany was sighted during the afternoon.

*Diomedea exulans chionopectera*, Salvin (*D. exulans*, Linné).—Wandering Albatrosses certainly occur on the Western Australian coast, and are probably referable to this sub-species. Several specimens were seen on 22nd January, when in the vicinity of Chatham Island, and also off the Leeuwin on 24th January.

*Nealbatrus chlororhynchus carteri*, Rothschild (*D. chlororhynchus*, Gmelin, and *D. carteri*, Rothschild).—This species was met with in some numbers off the Leeuwin, both in August and January. Most of the specimens seen at all closely had a marked yellow culmen, but several were seen with an entirely black bill.

*Thalassarche melanophrys impavida*, Mathews (*Diomedea melanophrys*, Temminck).—This species is common in the Great Australian Bight, but does not seem to occur on the west coast. Coming westward, it was interesting to note the sudden change in the species of "Mollymawk" following the vessel. From 27th August to 29th August *T. melanophrys* was abundant. On the latter date one specimen of *N. chlororhynchus* was seen towards sunset, the vessel being then close to Albany. On the following day we were off Cape Leeuwin at 7 a.m.; *T. melanophrys* was scarce, but *N. chlororhynchus* was very numerous.

*Phæbetria fusca campbelli*, Mathews (*P. fuliginosa*, Gmelin).—Specimens were seen on the morning of 22nd January, and land near Chatham Island was sighted near noon of that day.—EUSTACE W. FERGUSON, M.B., Ch. M. Sydney.

\* \* \*

**Notes on the Mistletoe-Bird** (*Dicaeum hirundinaceum*).—Here, in the heart of East Brisbane, a Mistletoe-Bird is calling outside my window. It has been a frequent visitor to this spot for more than two months past. There is only a male bird to be noted; if his consort is about, I have not had the pleasure of seeing her. In Victoria I did not find *Dicaeum hirundinaceum* so partial to

habitated areas; the birds were always a mile or two from any town.

The Mistletoe-Bird's nest is the only one I have searched for repeatedly without success. In November, 1912, a pair of the bright little birds came about the Maryborough (Vic.) cemetery. To them I devoted many hours. I found them hard to locate when the ecstatic male did not chance to be in talkative vein. But that was not often. He always kept to the tree-tops, and freely gave voice to a hard, sweet, penetrating note, that sounded like "A-white-a-whit-a-whit." Then would come usually a rapid run of notes—"Tang-tang-tang-tang-tang-tang." The ventriloquial element in the notes made it difficult to place the bird, and then he would flit away so rapidly, and at such a height, that the eye could not possibly follow him.

Throughout the following winter I heard and saw nothing of the birds, but they were in evidence again in the spring of 1913. "Tar-tar-tar" the male called in greeting, and this was followed quickly by the "Whit-a" run of notes. The South Australian session of the R.A.O.U. intervened just then, and when I returned the birds were in possession of three grey and white fledgelings, which actively followed their parents. Evidently the adult birds did not leave the locality in the following autumn. On 3rd April and 10th May, 1914, I met the male bird again. He was as happy as ever, and sat preening his feathers in a eucalypt; but on both occasions the ecstatic spring note was absent. In its stead, however, the bird uttered a run of sweet notes, rather richer than the usual somewhat hard bar. (It was on this occasion that I saw one of the prettiest sights afforded me by a bird. A flash of red went past, and the next moment a Scarlet-breasted Robin perched on the bowed head of a graceful angelic marble figure, which, with outspread wings, surmounted a grave.)

I was not able to see much of the Mistletoe-Birds in the spring of 1914, and, after that, did not renew acquaintance with them till 6th October, 1915. On that day I heard a note akin to the frog-like rattle of the Red-capped Robin (*Petroica goodenovii*). It came from a male *Dicaeum*, which sat in a low sapling preening its beautiful red and blue feathers in the sunshine. Within the next half-hour both male and female visited a dozen different bushes about the hillside, but always their circles brought them back to one particular cluster only four feet from the ground. Close examination of this bush showed me the faintest little cluster of soft threads suspended from a branchlet. These "foundation" strands were not added to during the next few days, and I had to leave Victoria without having secured a "sitting" from the birds. All the more cordially, therefore, do I congratulate Messrs. Lawrence and Littlejohns on the splendid photographs of *Dicaeum hirundinaceum* published in *The Emu*.\*—A. H. CHISHOLM. East Brisbane (Qld.), 19/2/16.

\* Vol. xv., part 3, p. 166.

## Correspondence.

A CORRECTION.

To the Editors of *The Emu*.

Sirs,—Some notes by Mr. M. W. Elliott on *Hylacola cauta*, and a short description of a clutch of eggs, appear in *The Emu*. As the description clearly indicated that the eggs described were not those of the bird referred to, I wrote to Mr. Elliott, furnished him with a full description of the eggs of *Hylacola cauta*, and made certain suggestions as to how an error might have been made. I am now in receipt of a reply to the effect that the bird described by Mr. Elliott was not a *Hylacola* but an *Amytornis*, and the mistake arose owing to the incorrect labelling of a specimen in the Western Australian Museum. Mr. Elliott's description of haunts and habits would fit both genera, but, while the birds are alike in these respects, there is no likeness between the eggs laid by a Ground-Wren and those laid by a Grass-Wren, and the description of eggs given by Mr. Elliott would well apply to the latter, but not to the former.—Yours truly,

54 Claremont-avenue, Malvern, 28/2/16.

J. A. ROSS.

## DISTRIBUTION OF AUSTRALIAN BIRDS.

To the Editors of "*The Emu*."

Sirs,—Mr. A. G. Campbell, referring to my former letter,\* states †:—"Mr. Howe furnishes for 'corrections and omissions' a list of 27 species, or, rather, mostly sub-species;" and adds "if Mr. Howe refers to their names or equivalent names in the 'Official Check-list of the R.A.O.U.' I think he will find that all the localities (States, at least) that he has mentioned are recorded, save in one doubtful instance." Mr. Campbell is nearly correct, for they are all recorded in that "Check-list." But he has missed the substance of my letter. I was criticising "A List of the Birds of Australia," by Gregory M. Mathews, published in 1913, and did not refer to any other list or author; and my reason for criticising the list by Mr. Mathews was that, notwithstanding its many imperfections, it, in my opinion, represents progressive ornithology better than any other list of Australian birds yet produced. I was well aware that many books and lists had recorded the distribution as mentioned by me, and that was why I was astonished that there were so many omissions from the particular list in question.

I was also aware that Mr. A. J. Campbell had recorded the taking of the eggs of *Tropidorhynchus corniculatus* at Ferntree Gully, and there is nothing in my letter to indicate that I was not quoting from that record. As a matter of fact, when I wrote I had in mind a nest which I found at the same place in 1907, but I might, instead of mentioning Ferntree Gully, have

\* *Emu*, vol. xv., pp. 71, 72.† *Emu*, vol. xv., p. 202.



Brown Flycatcher at Nest.



Brown Fly-catcher Feeding Young.

FROM PHOTOS. BY A. OPIE



referred to Stawell, Whittlesea, and other places where I have seen this bird nesting. This form is plentifully distributed over the whole of the State, with the exception, perhaps, of the north-western part of Victoria.

By way of answer to Mr. Campbell's query as to *Tyto longimembris walleri*. I would refer him to the list I was criticising. Naturally, I used the names given therein. Mr. Mathews has placed the Australian Grass-Owl in the genus *Tyto*, and gives its range as New South Wales, Queensland, and Northern Territory; but there are two fine specimens of this bird mounted in the Australian collection at the Melbourne National Museum. Both specimens were obtained in Victoria in April, 1890, but the exact locality, unfortunately, is not known.

If Mr. Campbell had been conversant with the list now under discussion he would not have written that the use of "bald, Cerberus-headed, previously-unheard-of names may prove a serious drawback in Australian ornithology." Many of the names used by Mr. Mathews have been rescued from obscurity, and others must be similarly brought to light from time to time if the "law of priority" is to be observed. When the name of a bird is changed, or an old name is substituted for one recently in use, most of those who are keenly interested ascertain as soon as possible the reason or reasons for the alteration. The list produced by Mr. Mathews will not prove a drawback to Australian ornithology. On the contrary, it has already borne good fruit, for it is one of the incentives for the proposal to issue a new R.A.O.U. Check-list.—Yours, &c.,

Canterbury, 1st February, 1916.

FRANK E. HOWE.

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#### COLORATION AND CLASSIFICATION.

To the Editors of "*The Emu*."

Gentlemen,—I should be grateful if you would afford me an opportunity of placing before my brother ornithologists in Australia, whose good opinion I value, a more exact version of my views on the significance of coloration as a factor in avian classification than that given by Mr. Gregory M. Mathews in *The Emu* of October last,\* which I read with amazement.

Mr. Mathews is presumably anxious to show that his views on this theme have my support, but his methods of demonstrating this are, to say the least, questionable.

To begin with, he evidently deems it inadvisable to inform his readers that his report of my part in this debate is taken, *verbatim*, from the Bulletin of the British Ornithologists' Club. Nor does he state that, to achieve his purpose—whatever that may have been—he had to omit the passages which I now beg to restore to their context.

Mr. Mathews has been very thorough in his misquotations.

\* *Emu*, vol. xv., pp. 118-130.

He even transposes the sequence of my remarks to give point to his purpose. Thus, "the following admission" (p. 125), which I am supposed to have made, occurred, not in my opening remarks, but towards the middle thereof. That "admission" begins with the statement—"A little time ago I had occasion to write part of a book on British birds." My meaning in the passage, "I find I did not express myself at sufficient length to carry exactly the meaning I had intended to convey," was, as the sequel to the whole paragraph shows, that I had not sufficiently insisted on the *uselessness* of coloration as a factor in this connection. Mr. Mathews implies that my meaning was that, whereas I *then* deprecated the use of coloration, I *now* agree that it is all-important. Nothing could be further from the truth, so far as I am concerned. Every line that I have ever written shows this; every word I spoke in that debate demonstrates it. And Mr. Mathews has the effrontery to endeavour to prove the opposite! Mr. Mathews carefully omits the concluding passages in that paragraph, which goes on to show that others "have evidently also come to the conclusion that coloration, *in itself*, is *not* a character on which one can, as a rule, rely for the purposes of classification." (Italics mine.)

Stopping at a point convenient to his purpose, he continues with the astounding\* statement:—"He followed up his conversion with the further illuminating remarks:—'I certainly agree that coloration is an extremely important factor in classification, and one that has been far too much neglected.'" Here, again, he deliberately omits the whole of the rest of the paragraph, which immediately runs on:—"But I think we are in danger of making too much of it. There are other things to be considered besides coloration. . . . Colour alone ought not to be taken as the factor for the determination of generic characters. We ought to begin with the deeper-seated characters."

I think I need not extend this analysis of Mr. Mathews's ideas of criticism.† Henceforth, can any reliance be placed on quotations by Mr. Mathews?—Yours very truly,

W. P. PYCRAFT.

British Museum (Natural History), Cromwell-road, London, S.W.,  
14th December, 1915.

P.S.—On the occasion of this debate, I should like to say that I had to speak without notes or previous preparation, having been for some months previously engaged on an official report on human crania. Had I had an opportunity of carefully choosing my words I should not have described coloration as "an extremely important" factor in classification. I should have said, "a very useful aid to the grouping of species."

\* Astounding, because, instead of "following up" with this statement, I *began* therewith!

† The printing committee and editors considered it advisable to omit one sentence which was not essential to Mr. Pycraft's argument.—[EDS.]

## Review.

"SCIENTIFIC Notes on an Expedition into the North-Western Regions of South Australia," by S. A. White, M.B.O.U., and others, reprinted from "Transactions of the Royal Society of South Australia," vol. xxxix., 1915, will be welcomed by all interested in the "Dead Heart" of Australia. It is fortunate for scientific research in general, and ornithology in particular, that the lure of this romantic region has so drawn our President, Captain S. A. White, that he has completed another big trip into this vast area. The present party visited the unexplored Everard Ranges, where a tribe of aborigines unknown to white men was met with. Captain White was able to make friends with the chief of the tribe, with valuable results. The fine series of photographs reveals a people of splendid physique, and of great interest to anthropologists. Varied collections were made by Captain White in different branches of zoology and botany. These have been dealt with by Messrs. Edgar R. Waite, F.L.S. (Mammalia and Ophidia), Lacertilia (F. R. Zietz), Mollusca (A. R. Riddle), Arachnida (W. J. Rainbow), Coleoptera (A. M. Lea, F.E.S.), Lepidoptera (A. Jefferies Turner, M.D., F.E.S.), Hymenoptera (Professor W. M. Wheeler), Botany (J. M. Black), and Language of the Everard Range Tribe (J. M. Black), while Captain White himself has supplied the interesting "Narrative" of the expedition, the valuable account of the "Aborigines of the Everard Range," and the section treating of "Aves" (Birds).

Captain White, with Mr. J. P. Rogers, well known as a field ornithologist and collector, accompanied a Government geological expedition into the unknown North-West from Oodnadatta. John Gould's long-lost Chestnut-breasted Whiteface (*Aphelocephala pectoralis*) was re-discovered, and two sub-species of birds new to science were discovered.

Captain White, the "explorer ornithologist," has earned the gratitude of Australian nature students by his zealous and self-denying labours and by his faithful scientific treatment of the material collected on these arduous journeys into the vast solitudes of those central deserts.

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## Obituary Notice.

MR. Henry Eeles Dresser, the author of a number of important ornithological works, died suddenly on 26th November, 1915, at Cannes, France, at the age of 77 years. For the past seven years he had been in failing health. The cause of death was heart failure. The late Mr. Dresser's collection of Palearctic birds' skins and eggs, the material on which his monograph was based, together with his library of ornithological works, are in the possession of the Manchester Museum, England.

## Publications Received.

*The Australian Naturalist*, January, 1916.

*The Victorian Naturalist*, January and February, 1916.

The January number contains an interesting article by Mr. G. A. Keartland, entitled "A Study of Birds at Breeding Time."

*The Report of the Board of Governors of the Public Library, Museum, and Art Gallery of South Australia for 1914-15.*

It is stated in the report that the Museum now contains the skins of 520 species of birds, and the collection includes many sub-species and different phases of plumage due to age, sex, season, and colour variation.

*The Zoologist*, November-December, 1915.

In the November number is an interesting and instructive article on the "Pleistocene and Later Bird Fauna of Great Britain and Ireland." by Mr. Alfred Bell.

*Proceedings of the Academy of Natural Sciences of Philadelphia*, April to August, 1915.

*Avicultural Magazine*, November, December, 1915, January, 1916.

In the November number Dr. A. J. Butler gives an account of the longevity of Zebra Finches (*Tæniopygia castanotis*) in an aviary. His experience is that the birds need much shelter in winter. In his aviary, in which he introduced a radiator in cold weather, they lived for years, and bred all the year round. Dr. Butler concludes that these birds, although hardy, are naturally short-lived, although one of his specimens lived for 10 years. The December number contains an article by the Marquis of Tavistock on "Pennant Parrakeets at Liberty." Many of the birds made full use of their liberty by flying away from where they would be protected and fed. In one case the young left the nest when in adult crimson plumage, which is very unusual. Dr. Hopkinson concludes his article on "English Names for the Parrots." In the January number Mr. G. A. Heumann gives an account of his week-end trips to the country adjacent to Sydney in spring, and of the bird-life he saw there.

*British Birds*, November, December, 1915, January, 1916.

*Revue Francaise d'Ornithologie*, November, December, 1915.

In the November number appears an interesting article by Mons. P. Bede on "Birds and Electricity." In the December number Dr. Millet-Horsin gives a list of 36 birds observed at the island of Lemnos. Many of the birds mentioned were also observed by Dr. H. W. Bryant, R.A.O.U., of Melbourne.

*Annual Report of the Smithsonian Institute for 1914.*

Expeditions to little-known parts of the world continue to be sent out by the Institute, and their results must greatly enrich

the American museums. A most complete and well-illustrated article on the Herring Gull, by R. M. Strong, is published in the report, and contains much information on the nesting habits of these birds.

*Our Dumb Animals*, November, 1915, Massachusetts.

Dr. R. W. Shufeldt has an article on the King-Bird or Tyrant Flycatcher, in which he shows how inaccurate the title "Tyrant" is when applied to this delightful bird.

*Blue-Bird* (junior Audubon monthly), September, 1915.

Part III. of Dr. R. W. Shufeldt's article on the "Eggs of North American Water-Birds" appears in this issue. Beautiful illustrations in natural size are given of the eggs of Xantus Murrelet (*Brachyramphus hypoleucus*), Black Guillemot (*Cepphus grylle*), and Razor-billed Auk (*Alca torda*).

*The South Australian Ornithologist*, January, 1916.

Capt. S. A. White describes a new sub-species of Parrot, which he names *Barnardius barnardi lindoi*, from Flinders Range, South Australia. Dr. A. M. Morgan gives an account of "The Migration of Swallows in South Australia." We have still much to learn concerning the migration of our birds, and this article is helpful.

Mr. H. C. Oberholser has forwarded a reprint of his "Review of the Sub-species of the Ruddy Kingfisher (*Entomothera coramanda*)," published in the *Proceedings of the U.S. National Museum*, 1915. The number of sub-species recognized is nine, from Celebes, Andaman Islands, Malay Peninsula, Philippine Islands, Japan, Riu Kiu Island, Pago Island, Borneo, and Sumatra; those from Andaman Islands, Sumatra, Pago Island, Philippine Islands, and Riu Kiu Islands being described as new.

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## Members of R.A.O.U., 1916.

### HONORARY MEMBERS.

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GRANT, OGILVIE, Bird Department, South Kensington Museum, London.

HORNADAY, DR. W. T., Director Zoological Park, New York, U.S.A.

RIDGWAY, PROF. ROBERT, Curator Division of Birds, National Museum, Washington, D.C., U.S.A.

SALVADORI, COUNT TOMMASO, Zoological Museum, Turin, Italy.

SHUFELDT, DR. R. W., 3,356 Eighteenth-street, Washington, D.C., U.S.A.

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 KENDALL, H., "Koolonga," Milan-street, Mentone, Victoria.  
 MACDONALD, DONALD, *Argus* Office, Melbourne, Victoria.  
 WHITE, H. L., M.B.O.U., "Belltrees," Scone, N.S.W.  
 WHITE, CAPT. S. A., M.B.O.U., "Wetunga," Fulham, South  
 Australia.

## MEMBERS.

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 ANDERSON, MAJOR T., 203 Mill-street, Ballarat.  
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 ARCHER, ROWLAND H., Tooradin.  
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 AUSTIN, E. G., Borri Yalloak, Skipton.  
 BARR, JAS., A.I.A.V., 42 Temple-court, Melbourne.  
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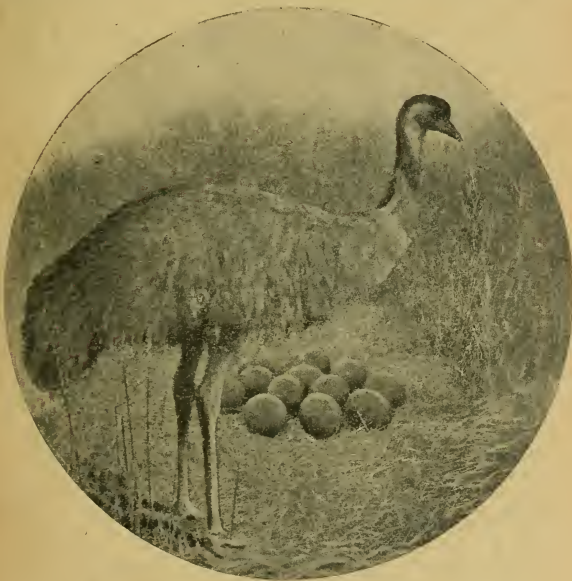
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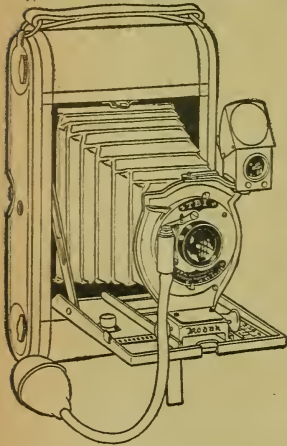
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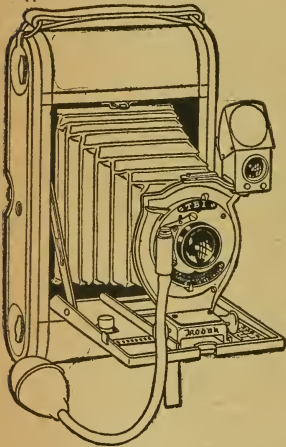
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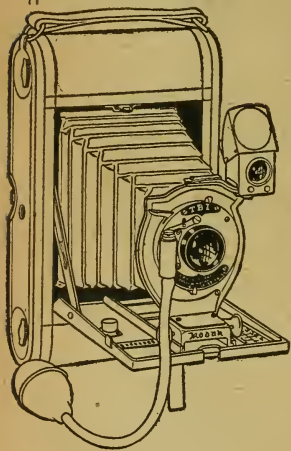
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